Installation, Start-Up and Service Instructions

CONTENTS

Page

SAFETY CONSIDERATIONS 1
INSTALLATION 1-24
Step 1 — Provide Unit Support 1
• ROOF CURB
• ALTERNATE UNIT SUPPORT
Step 2 — Rig and Place Unit 1
• POSITIONING
• ROOF MOUNT
Step 3 — Field Fabricate Ductwork 3
Step 4 — Make Unit Duct Connections 7
Step 5 — Trap Condensate Drain 7
Step 6 — Make Electrical Connections 7
• FIELD POWER SUPPLY
• FIELD CONTROL WIRING
• OPTIONAL NON-FUSED DISCONNECT
• OPTIONAL CONVENIENCE OUTLET
Step 7 — Make Outdoor-Air Inlet Adjustments . . 10
• MANUAL OUTDOOR-AIR DAMPER
Step 8 — Install Outdoor-Air Hood 10
Step 9 — Install All Accessories 10
• MOTORMASTER® I CONTROL INSTALLATION
Step 10 — Adjust Factory-Installed Options 12
• PREMIERLINK™ CONTROL
• ENTHALPY SWITCH/RECEIVER
• OUTDOOR ENTHALPY CONTROL
• DIFFERENTIAL ENTHALPY CONTROL
• ENTHALPY SENSORS AND CONTROL
• OPTIONAL ECONOMI$ERIV AND ECONOMI$ER2
• ECONOMI$ERIV STANDARD SENSORS
• ECONOMI$ERIV CONTROL MODES
Step 11 — Set Defrost Cycle 24
START-UP 24-31
SERVICE 31-37
TROUBLESHOOTING 38-43
INDEX 44
START-UP CHECKLIST CL-1

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

IMPORTANT: Units have high ambient operating limits. If limits are exceeded, the unit will automatically lock the compressor out of operation. Manual reset will be required to restart the compressor.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with the curb. Accessory roof curb and information required to field fabricate a roof curb are shown in Fig. 1 and 2. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be secured to roof curb before unit is set in place. Horizontal adapter installation is shown in Fig. 2.

IMPORTANT: The gasketing of the unit to the roof curb is critical for watertight seal. Install gasket supplied with the roof curb as shown in Fig. 1. Improperly applied gasket can result in air leaks and poor unit performance.

Curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerances is $\pm\ ^1/_{16}$ in. per linear ft in any direction. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

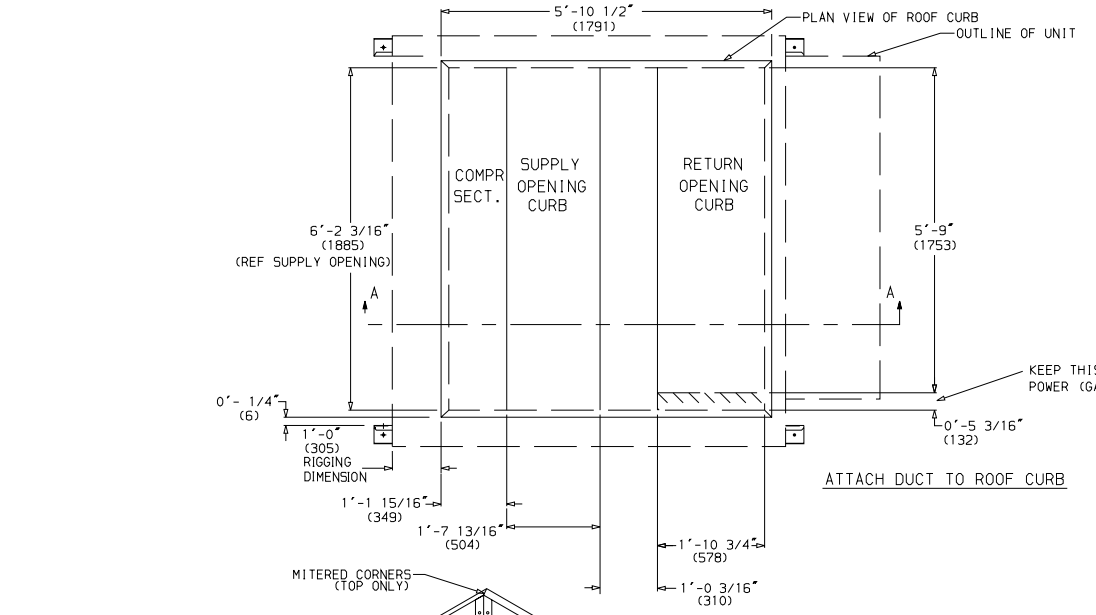
ALTERNATE UNIT SUPPORT — When the curb cannot be used, support unit with sleepers using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

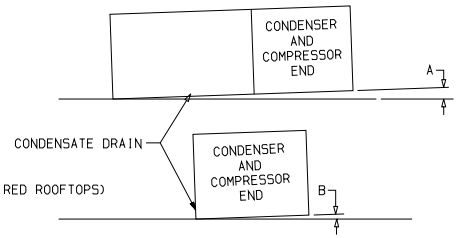
Step 2 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright, and do not drop. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as a reference; leveling tolerance is $\pm\ ^1/_{16}$ in. per linear ft in any direction. See Fig. 1 for additional leveling tolerance information. Unit weight is shown in Table 1.

Four lifting holes are provided in ends of unit base rails as shown in Fig. 3. Refer to rigging instructions on unit.

PKG. NO. REF.	CURB HEIGHT	DESCRIPTION
CRRFCURB010A00	1′-2″ (305)	Standard Curb 14″ High
CRRFCURB011A00	2′-0″ (610)	Standard Curb for Units Requiring High Installation
CRRFCURB012A00	2′-0″ (610)	Side Supply and Return Curb for High Installation

NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 1″ thick neoprene coated $1^1/_2$ lb density.
3. Dimensions in ( ) are in millimeters.
4. ⇨ Direction of airflow.
5. Roof curb: 16 ga. (VA03-56) stl.
6. **A 90 degree elbow must be installed on the supply ductwork below the unit discharge for units equipped with electric heaters.**
7. To prevent the hazard of stagnant water build-up in the drain pan of the indoor section, unit can only be pitched as shown.

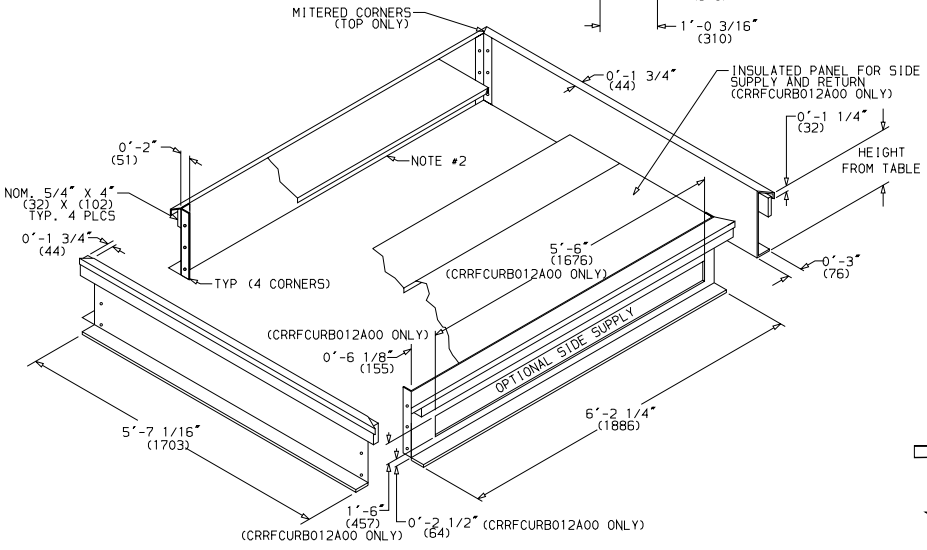


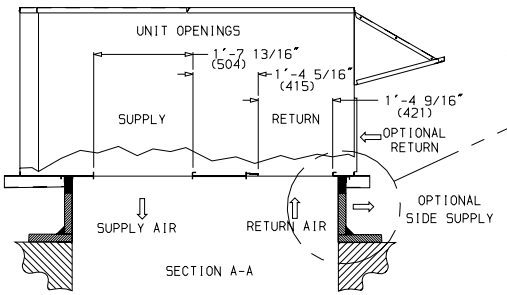


DIMENSIONS* (degrees and inches)

UNIT	A		B	
	Deg.	in.	Deg.	in.
ALL	.28	.45	.28	.43

UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.





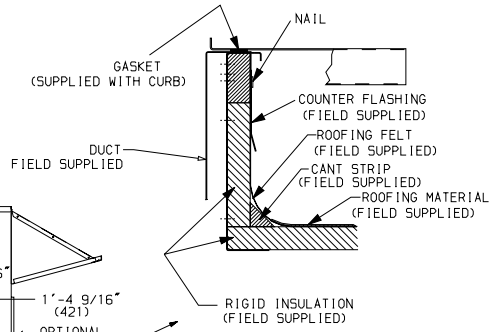
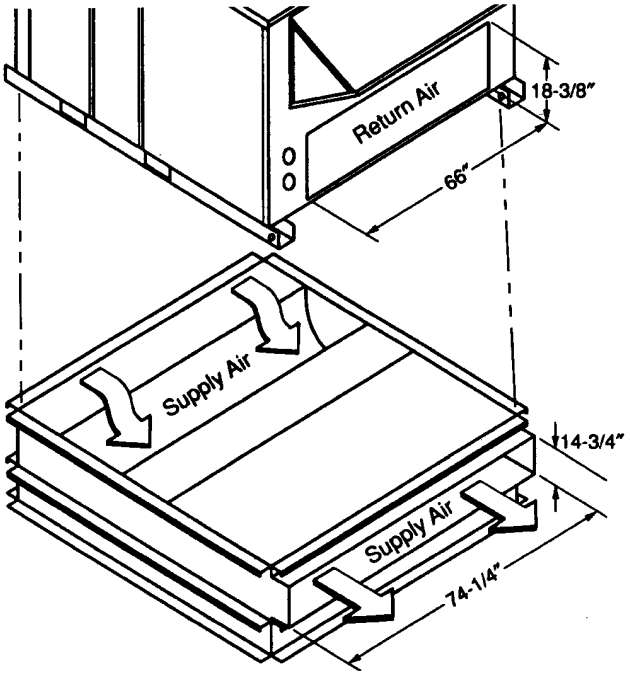
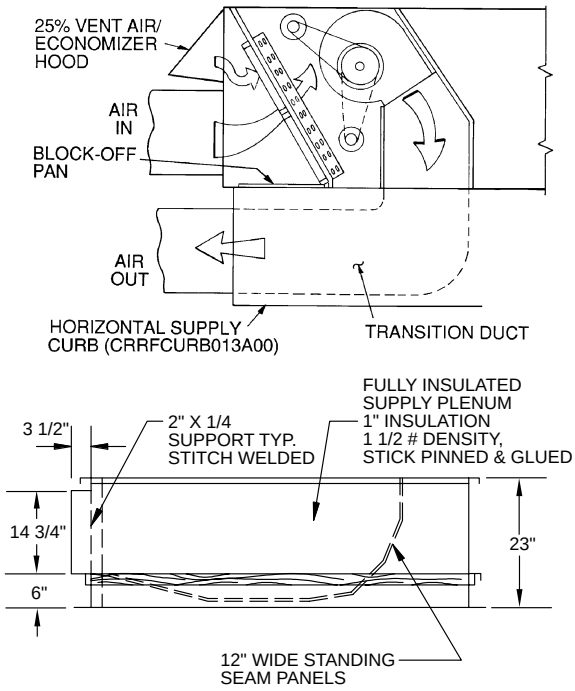


Fig. 1 — Roof Curb Details



NOTE: CRRFCURB013A00 is a fully factory preassembled horizontal adapter and includes an insulated transition duct. The pressure drop through the adapter curb is negligible.

For horizontal return applications: The power exhaust and barometric relief dampers must be installed in the return air duct.



ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION
CRRFCURB013A00	1′-11″ (584)	Pre-Assembled, Horizontal Adapter Roof Curb

Fig. 2 — Horizontal Supply/Return Curb and Horizontal Adapter Details

POSITIONING — Provide clearance around and above unit for airflow, safety, and service access (Fig. 4 and 5).

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

ROOF MOUNT — Check building codes for weight distribution requirements.

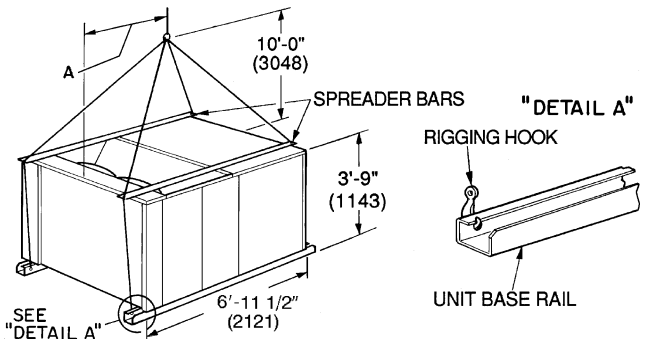
Step 3 — Field Fabricate Ductwork — Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

The 50HJQ units with electric heat require a 1-in. clearance for the first 24 in. of ductwork.

Outlet grilles must not lie directly below unit discharge.

NOTE: A 90-degree elbow must be provided in the ductwork to comply with UL (Underwriters Laboratories) codes for use with electric heat.



UNIT 50HJQ	MAXIMUM SHIPPING WEIGHT	
	lb	kg
014	1895	860
016	2205	1000

DIMENSION A

UNIT 50HJQ	ft-in.	mm
014	3-1	948
016	3-6	1059

NOTES:
1. Dimensions in ( ) are in millimeters.
2. Refer to Table 1 for unit operating weights.
3. Remove boards at ends of unit and runners prior to rigging.
4. Rig by inserting hooks into unit base rails as shown. Use corner post from packaging to protect coil from damage. Use bumper boards for spreader bars.
5. Weights do not include optional economizer. See Table 1 for economizer weight.
6. Weights given are for aluminum indoor coil plate fins and copper outdoor coil plate fins. Weights of other metal combinations are listed in Table 1.

⚠ CAUTION

All panels must be in place when rigging.

Fig. 3 — Rigging Details

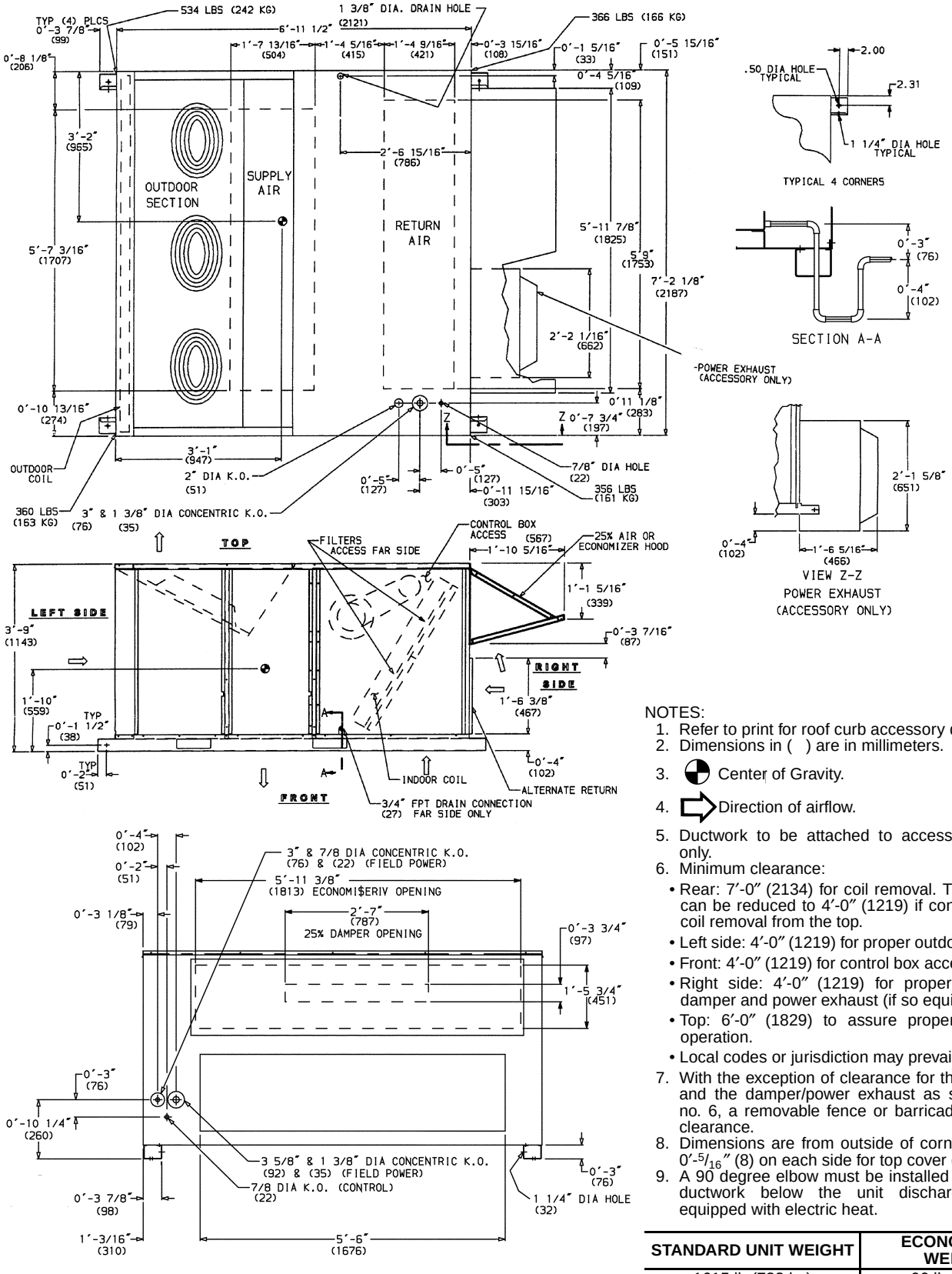
Table 1 — Physical Data

UNIT SIZE 50HJQ	014		016
	208/230, 460 V	575 V	
NOMINAL CAPACITY (tons)	13		15
OPERATING WT (lb)			
Al/Al*	1615		1925
Al/Al Coated*	1615		1925
Unit Al/Cu*	1745		2075
Cu/Cu*	1815		2165
Electric Heat	65		65
Economizer	90		90
Roof Curb†	200		200
COMPRESSOR	Semi-Hermetic		
Type (Number)	06D-328 (1)		06D-818 (2)
Cylinders	6		4
Oil Change (oz.) (each circuit)	115		88
REFRIGERANT TYPE	R-22		
Charge (lb)			
System 1	26.0		16.5
System 2	—		16.5
OUTDOOR COIL	3/8 in., Internally Grooved Copper Tubes, Aluminum or Copper Lanced Fins		
Rows	3		3
Fins/in.	15		15
Total Face Area (sq ft)	21.7		21.7
OUTDOOR FAN	Propeller Type, Direct Drive		
Nominal Cfm	9,000		9,000
Number...Diameter (in.)	3...22		3...22
Motor Hp (1075 rpm)	1/2		1/2
Watts Input (Total)	1090		1090
INDOOR COIL	3/8 in., Internally Grooved Copper Tubes, Aluminum or Copper Lanced Fins, Face Split		
Expansion Device	Fixed Orifice		
Rows	3		3
Fins/in.	15		15
Total Face Area (sq ft)	17.5		17.5
INDOOR FAN	Centrifugal, Adjustable Pitch Belt Drive		
Quantity...Size (in.)	2...10 x 10	2...10 x 10	2...12 x 12
Nominal Cfm	5000	5000	6000
Fan Rpm Range	862-1132	1201-1462	799-1010
Maximum Allowable Rpm	1550	1550	1550
Motor Pulley Pitch Diameter (in.)	3.1/4.1	4.3/5.3	3.7/4.7
Fan Pulley Pitch Diameter (in.)	6.0	6.4	11.4
Belt, Quantity...Type...Length (in.)	1...BX...42	1...B...45	1...BX...46
Pulley Center Line Distance (in.)	13.5-15.5	13.5-15.5	13.3-14.8
Speed Change Per Turn (rpm)	54	52	42
Pulley Maximum Full Turns	6**	5	6**
Factory Pulley Turns Setting	3	3 1/2	3
Factory Speed Setting (rpm)	1024	1279	926
Fan Shaft Diameter (in.)	1 3/16	1 3/16	1 7/16
Motor Hp (Service Factor)	3.7 (1.15)	3.0 (1.15)	5.0 (1.15)
Motor Frame Size	56H	56H	184T
Motor Efficiency	0.84	0.84	0.84
HIGH-PRESSURE SWITCH			
Cutout (psig)	426		
Reset (psig)	320		
LOW-PRESSURE/LOSS-OF-CHARGE SWITCH			
Cutout (psig)	7		
Reset (psig)	22		
AIR INLET SCREENS	Cleanable		
Economizer, Quantity...Size (in.)	2...20 x 25 x 1 1...20 x 20 x 1		
RETURN-AIR FILTERS (TYPE)	10% Efficient — 2-in. Throwaway Fiberglass		
Quantity...Size (in.)	4...20 x 20 x 2 4...16 x 20 x 2		
DEFROST THERMOSTAT			
Defrost Time	30 min (Adjustable to 50 or 90 min)		
Closes (F)	28		
Opens (F)	65		

LEGEND

Al — Aluminum
Cu — Copper

*Indoor coil fin material/outdoor coil fin material.
†Weight of 14 in. roof curb.
**Pulley cannot be run at 0 or 1/2 turns open.

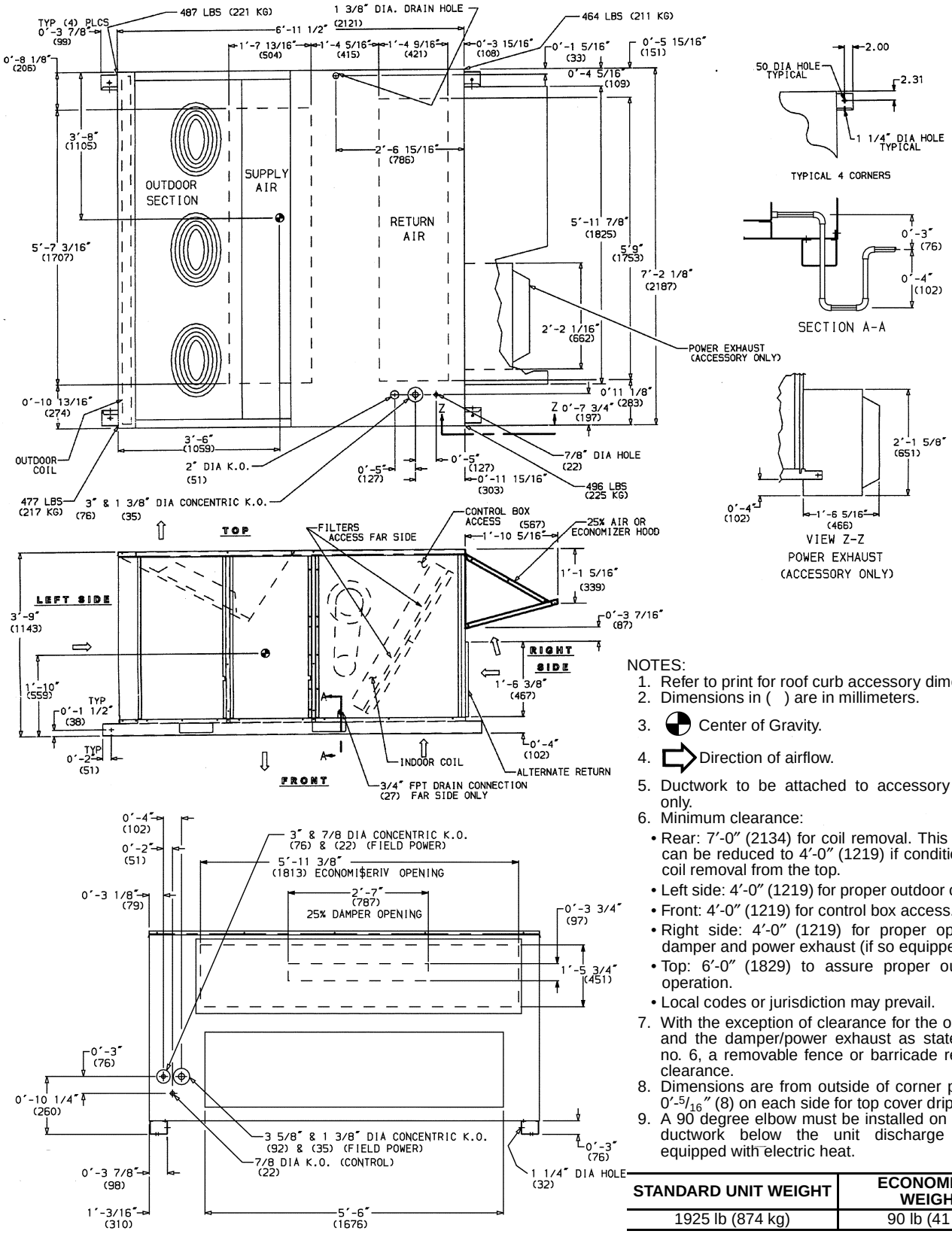


NOTES:

1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. Center of Gravity.
4. Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. Minimum clearance:
   - Rear: 7′-0″ (2134) for coil removal. This dimension can be reduced to 4′-0″ (1219) if conditions permit coil removal from the top.
   - Left side: 4′-0″ (1219) for proper outdoor coil airflow.
   - Front: 4′-0″ (1219) for control box access.
   - Right side: 4′-0″ (1219) for proper operation of damper and power exhaust (if so equipped).
   - Top: 6′-0″ (1829) to assure proper outdoor fan operation.
   - Local codes or jurisdiction may prevail.
7. With the exception of clearance for the outdoor coil and the damper/power exhaust as stated in note no. 6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0′-$^{5}/_{16}$″ (8) on each side for top cover drip edge.
9. A 90 degree elbow must be installed on the supply ductwork below the unit discharge for units equipped with electric heat.

STANDARD UNIT WEIGHT	ECONOMIZER WEIGHT
1615 lb (733 kg)	90 lb (41 kg)

Fig. 4 — Base Unit Dimensions — 50HJQ014



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   - Right side: 4′-0″ (1219) for proper operation of damper and power exhaust (if so equipped).
   - Top: 6′-0″ (1829) to assure proper outdoor fan operation.
   - Local codes or jurisdiction may prevail.
7. With the exception of clearance for the outdoor coil and the damper/power exhaust as stated in note no. 6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow $0'\text{-}^{5}/_{16}''$ (8) on each side for top cover drip edge.
9. A 90 degree elbow must be installed on the supply ductwork below the unit discharge for units equipped with electric heat.

STANDARD UNIT WEIGHT	ECONOMIZER WEIGHT
1925 lb (874 kg)	90 lb (41 kg)

Fig. 5 — Base Unit Dimensions — 50HJQ016

⚠ WARNING

For vertical supply and return units, tools or parts could drop into ductwork and cause injury. Install a 90-degree turn in the return ductwork between the unit and the conditioned space. If a 90-degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space. Due to electric heater, supply duct will require 90-degree elbow.

Step 4 — Make Unit Duct Connections — Unit is shipped for through-the-bottom duct connections. Ductwork openings are shown in Fig. 6. Field-fabricated concentric ductwork may be connected as shown in Fig. 7 and 8.

Attach all ductwork to roof curb and roof curb basepans. Refer to installation instructions shipped with accessory roof curb for more information.

Step 5 — Trap Condensate Drain — See Fig. 4 or 5 and 9 for drain location. Plug is provided in drain hole and must be removed when unit is operating. One $^3/_4$-in. half coupling is provided inside unit indoor air section for condensate drain connection. An $8^1/_2$ in. x $^3/_4$-in. diameter nipple and a 2-in. x $^3/_4$-in. diameter pipe nipple are coupled to standard $^3/_4$-in. diameter elbows to provide a straight path down through holes in unit base rails (see Fig. 10). A trap at least 4-in. deep must be used.

Step 6 — Make Electrical Connections

FIELD POWER SUPPLY — Unit is factory wired for voltage shown on nameplate.

When installing units, provide a disconnect of adequate size per NEC (National Electrical Code) requirements (Table 2).

All field wiring must comply with NEC and local requirements.

Route power lines through control box access panel or unit basepan (Fig. 4 and 5) to connections as shown on unit wiring diagram and Fig. 11.

Transformers no. 1 and 2 are wired for 230-v unit. If 208/203-v unit is to be run with 208-v power supply, the transformers must be rewired as follows:

1. Remove cap from red (208 v) wire.
2. Remove cap from orange (230 v) spliced wire.
3. Replace orange wire with red wire.
4. Recap both wires.

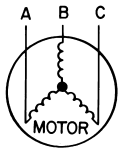
IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED. Failure to do so may damage the transformers.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current must be balanced within 10%.

Use the following formula to determine the percentage of voltage imbalance.

$$\text{Percentage of Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{455 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage:

(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine the percent voltage imbalance:

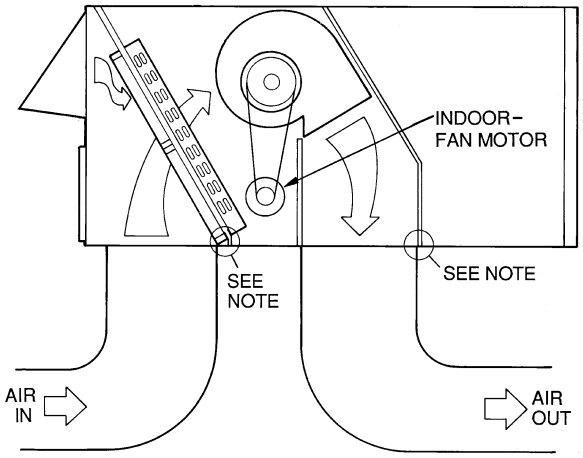
$$\text{Percentage of Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

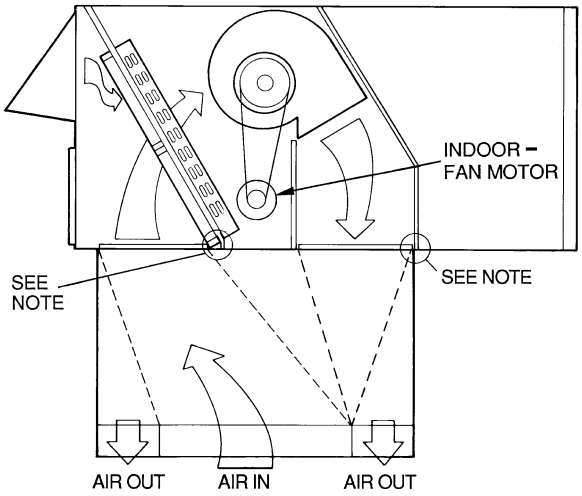
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.



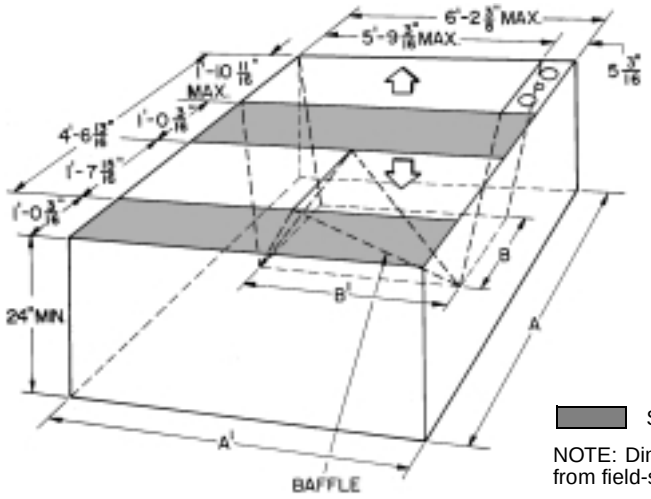
NOTE: Do not drill in this area, as damage to basepan may result in water leak.

Fig. 6 — Air Distribution — Thru-the-Bottom (50HJQ016 Shown)



NOTE: Do not drill in this area, as damage to basepan may result in water leak.

Fig. 7 — Concentric Duct Air Distribution (50HJQ016 Shown)



Shaded area indicates block-off panels.

NOTE: Dimensions A, A′ and B, B′ are obtained from field-supplied ceiling diffuser.

Fig. 8 — Concentric Duct Details

Table 2 — Electrical Data

UNIT 50HJQ	VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		OUTDOOR FAN MOTOR		INDOOR FAN MOTOR		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZING	
		Min	Max	RLA	LRA	RLA	LRA	Qty	FLA (ea)	Hp	FLA	FLA	LRA	FLA	kW	MCA	MOCP†	RLA	LRA
014	208/230	187	253	39.7	228	—	—	3	1.7	3.7	10.5/10.5	—	—	—/— 39/ 45 72/ 82 117/135	—/— 14/19 26/34 42/56	65/ 65 114/122 155/168 211/200	100/100 125/150 175/175 225/225	64/ 64 64/ 64 94/107 147/167	387/387
												4.6	18.8	—/— 39/ 45 72/ 82 117/135	—/— 14/19 26/34 42/56	70/ 70 119/126 159/173 216/205	100/100 125/150 175/175 225/225	69/ 69 69/ 69 100/112 152/173	406/406
	460	414	508	19.9	114	—	—	3	0.8	3.7	4.8	—	—	— 18 39 66	— 15 32 55	32 54 81 98	50 60 90 110	31 31 50 82	189
												2.3	6.0	— 18 39 66	— 15 32 55	34 57 83 100	50 70 90 110	34 34 53 84	195
	575	518	632	16.0	91	—	—	3	0.75	3.0	3.9	—	—	— 37	— 37	26 72	40 80	26 47	91
												2.1	4.8	— 37	— 37	28 75	40 80	28 50	96
016	208/230	187	253	28.2	160	28.2	160	3	1.7	5	15.8/15.8	—	—	—/— 72/ 82 117/135	—/— 26/34 42/56	84/ 84 174/187 231/219	110/110 175/200 250/225	89/ 89 101/112 153/173	499/485
												4.6	18.8	—/— 72/ 82 117/135	—/— 26/34 42/56	89/ 89 179/191 235/224	110/110 200/200 250/225	94/ 94 106/118 158/179	518/504
	460	414	508	14.1	80	14.1	80	3	0.8	5	7.9	—	—	— 39 66	— 32 55	42 91 108	50 100 110	44 54 85	238
												2.3	6.0	— 39 66	— 32 55	44 93 110	50 100 125	47 57 88	244
	575	518	632	11.3	64	11.3	64	3	0.75	5	6.0	—	—	— 50	— 50	34 96	40 100	35 64	165
												2.1	4.8	— 50	— 50	36 98	45 100	38 67	169

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
RLA — Rated Load Amps

*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v, and 600 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

†Fuse or HACR circuit breaker. This is the maximum size permissible; smaller fuse size may be used where conditions permit.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The Canadian units may be fuse or circuit breaker.
2. MCA calculation for units with electric heaters over 50 kW = (1.25 x IFM amps) + (1.00 x heater FLA).

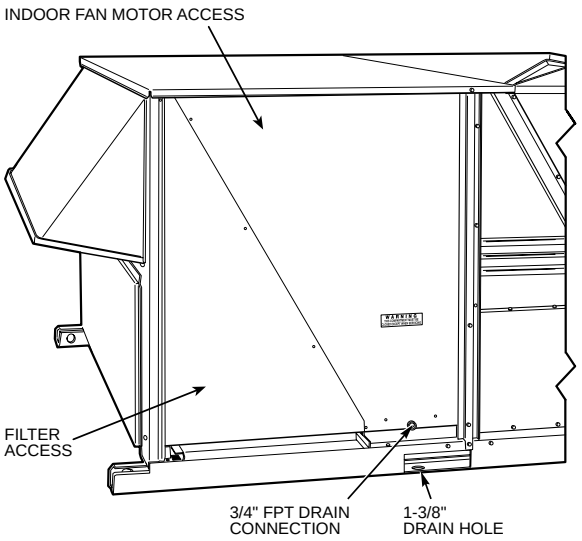


Fig. 9 — Condensate Drain Details

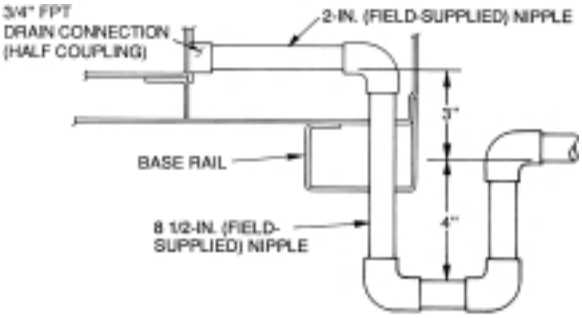
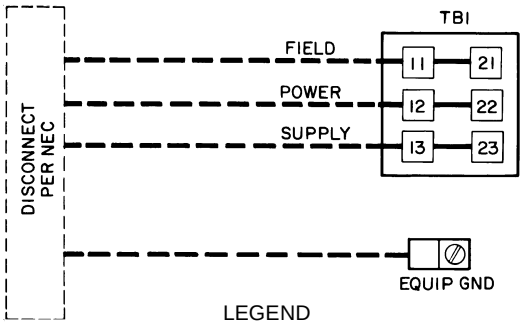


Fig. 10 — Condensate Drain Piping Details



NOTE: The maximum wire size for TB1 is 350 kcmil for all unit voltages.

Fig. 11 — Field Power Wiring Connections

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to the installation instructions included with the accessory. Refer to unit Price Pages or contact your local representative for more information. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of no. 18 AWG (American Wire Gage) colored wire from subbase terminals through conduit in unit to low-voltage connections as shown on unit label wiring diagram and in Fig. 12.

NOTE: For wire runs up to 50 ft, use no. 18 AWG insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Set heat anticipator settings as indicated in Table 3. Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

OPTIONAL NON-FUSED DISCONNECT — On units with the optional non-fused disconnect, incoming power will be wired into the disconnect switch. Refer to Fig. 13 for wiring for 100 and 200 amp disconnect switches. Units with an MOCP (maximum overcurrent protection) under 100 will use the 100 amp disconnect switch. Units with an MOCP over 100 will use the 200 amp disconnect switch. Refer to the applicable disconnect wiring diagram.

To prevent breakage during shipping, the disconnect handle and shaft are shipped and packaged inside the unit control box. Install the disconnect handle before unit operation. To install the handle and shaft, perform the following procedure:

1. Open the control box door and remove the handle and shaft from shipping location.
2. Loosen the Allen bolt located on the disconnect switch. The bolt is located on the square hole and is used to hold the shaft in place. The shaft cannot be inserted until the Allen bolt is moved.
3. Insert the disconnect shaft into the square hole on the disconnect switch. The end of the shaft is specially cut and the shaft can only be inserted in the correct orientation.
4. Tighten the Allen bolt to lock the shaft into position.
5. Close the control box door.
6. Attach the handle to the external access door with the two screws provided. When the handle is in the ON position, the handle will be vertical. When the handle is in the OFF position, the handle will be horizontal.
7. Turn the handle to the OFF position and close the door. The handle should fit over the end of the shaft when the door is closed.
8. The handle must be in the OFF position to open the control box door.

OPTIONAL CONVENIENCE OUTLET — On units with optional convenience outlet, a 115-v GFI (ground fault interrupt) convenience outlet receptacle is provided for field wiring. Field wiring should be run through the $^{7}/_{8}$-in. knockout provided in the basepan near the return air opening.

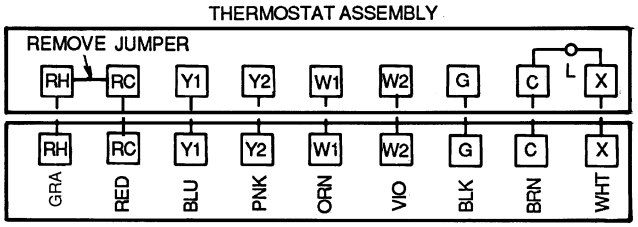
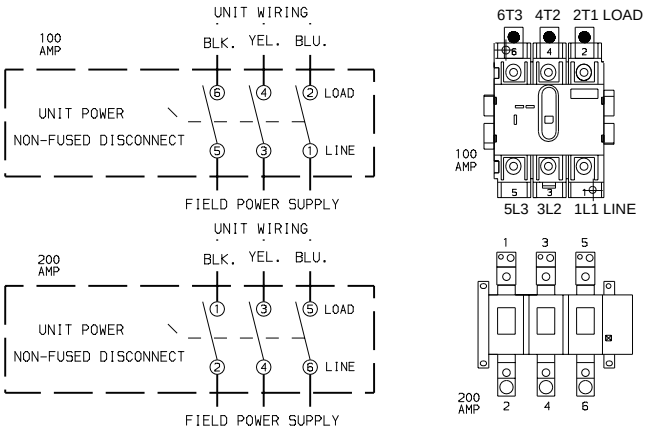


Fig. 12 — Field Control Thermostat Wiring

Table 3 — Heat Anticipator Settings

UNIT 50HJQ	UNIT VOLTAGE	HEATER kW	STAGE 1	STAGE 2
014	208/230	14/19 26/34 42/56	.40 .40 .66	— .40 .40
	460	15 32 55	.40 .40 .40	— .40 .66
	575	37	.40	.66
016	208/230	26/34 42/56	.40 .66	.66 .40
	460	32 55	.40 .40	.40 .66
	575	50	.66	.66



NOTE: The disconnect takes the place of TB-1 as shown on the unit wiring diagram label and the component arrangement label.

Fig. 13 — Optional Non-Fused Disconnect Wiring

Step 7 — Make Outdoor-Air Inlet Adjustments

MANUAL OUTDOOR-AIR DAMPER — All units (except those equipped with a factory-installed economizer) have a manual outdoor-air damper to provide ventilation air. Damper can be preset to admit up to 25% outdoor air into return-air compartment. To adjust, loosen securing screws and move damper to desired setting. Then retighten screws to secure damper (Fig. 14).

Step 8 — Install Outdoor-Air Hood

IMPORTANT: If the unit is equipped with the optional EconoMi$erIV component, move the outdoor-air temperature sensor prior to installing the outdoor-air hood. See the Optional EconoMi$erIV section for more information.

The same type of factory-installed hood is used on units with 25% air ventilation and units with an economizer.

NOTE: The hood top panel, upper and lower filter retainers, hood drain pan, and filter support bracket are secured opposite the condenser end of the unit. The screens, hood side panels, remaining section of filter support bracket, seal strip, and all other hardware are in a package located inside the return-air filter access panel (Fig. 15).

1. Attach seal strip to upper filter retainer. See Fig. 16.
2. Assemble hood top panel and side panels, upper filter retainer, and hood drain pan (Fig. 17).
3. Secure lower filter retainer and filter support bracket to unit. See Fig. 17.
4. Loosen sheet metal screws for base unit top panel located above outdoor-air inlet opening, and remove screws for hood side panels located on the sides of the outdoor-air inlet opening.
5. Match notches in hood top panel to unit top panel screws. Insert hood flange between unit top panel flange and unit. Tighten screws.
6. Hold hood side panel flanges flat against unit, and install screws removed in Step 4.
7. Insert outdoor-air inlet screens and spacer in channel created by lower filter retainer and filter support bracket.

Step 9 — Install All Accessories — After all the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory.

MOTORMASTER® I CONTROL INSTALLATION

Install Field-Fabricated Wind Baffles — Wind baffles must be field-fabricated for all units to ensure proper cooling cycle operation at low ambient temperatures. See Fig. 18 for baffle details. Use 20-gage, galvanized sheet metal, or similar corrosion-resistant metal for baffles. Use field-supplied screws to attach baffles to unit. Screws should be $^1/_4$-in. diameter and $^5/_8$-in. long. Drill required screw holes for mounting baffles.

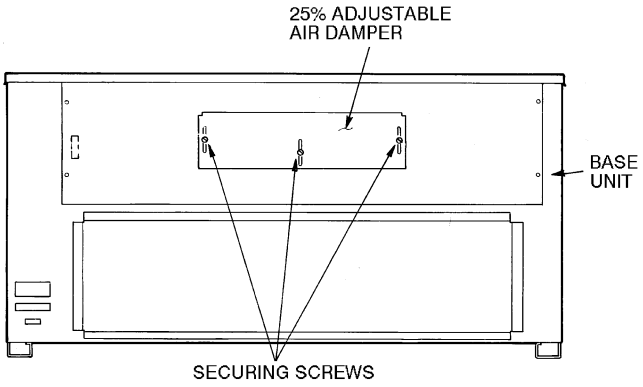


Fig. 14 — 25% Outdoor-Air Section Details

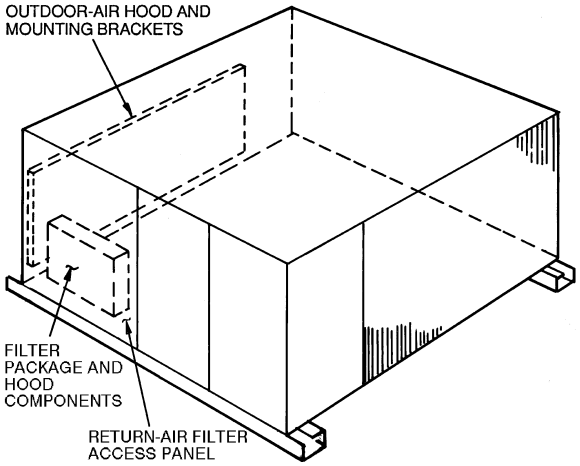


Fig. 15 — Outdoor-Air Hood Component Location

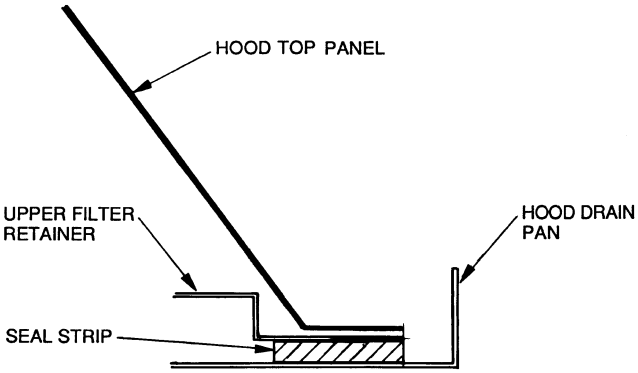
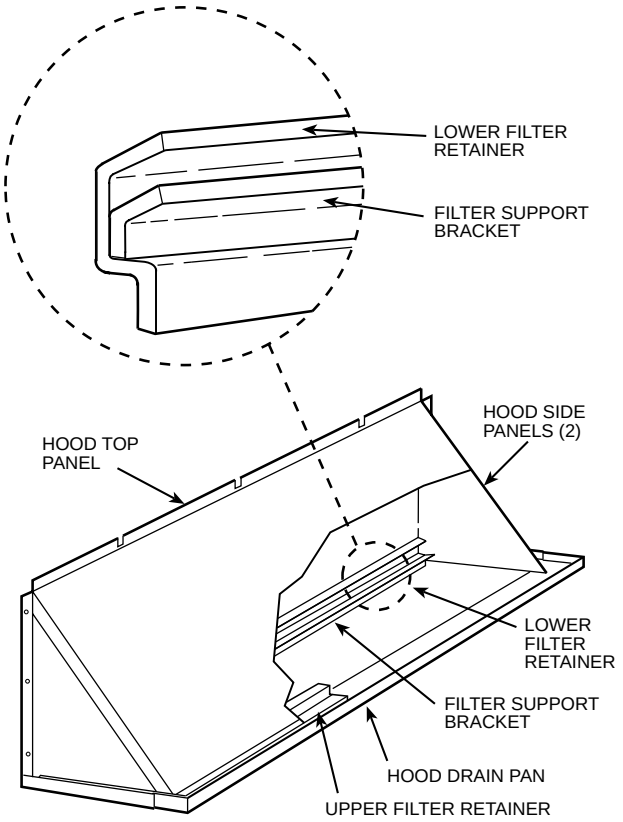
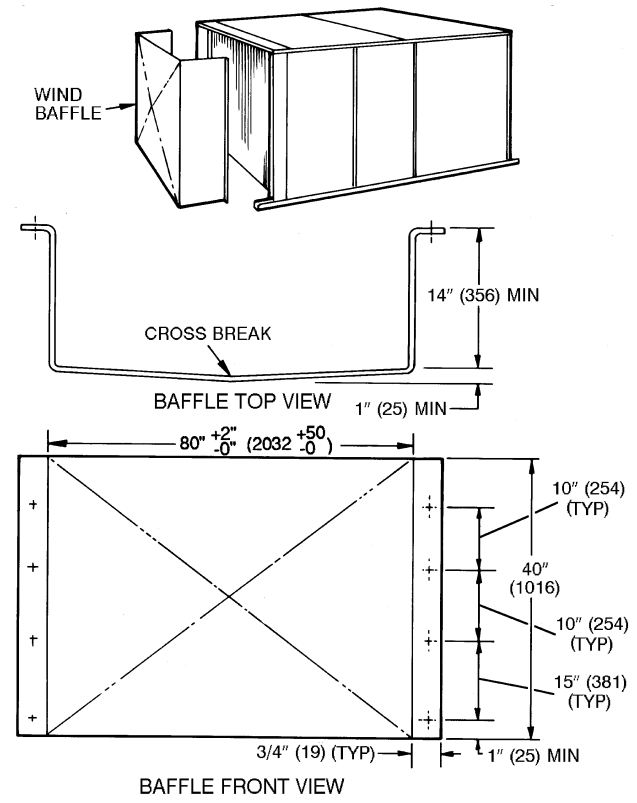


Fig. 16 — Seal Strip Location (Air Hood Cross-Sectional View)



NOTE: The outdoor-air hood comes with a baffle which is not used on 50HJQ units. Discard the baffle.

Fig. 17 — Outdoor-Air Hood Details



NOTE: Dimensions in ( ) are in mm.

Fig. 18 — Wind Baffle Details

⚠ CAUTION

To avoid damage to the refrigerant coils and electrical components, use recommended screw sizes only. Use care when drilling holes.

Install Motormaster I Controls — Only one Motormaster I control is required per unit. The Motormaster I control must be used in conjunction with the Accessory 0° F Low Ambient Kit (purchased separately). The Motormaster I device controls outdoor fan no. 1 while outdoor fans no. 2 and 3 are sequenced off by the Accessory 0° F Low Ambient Kit.

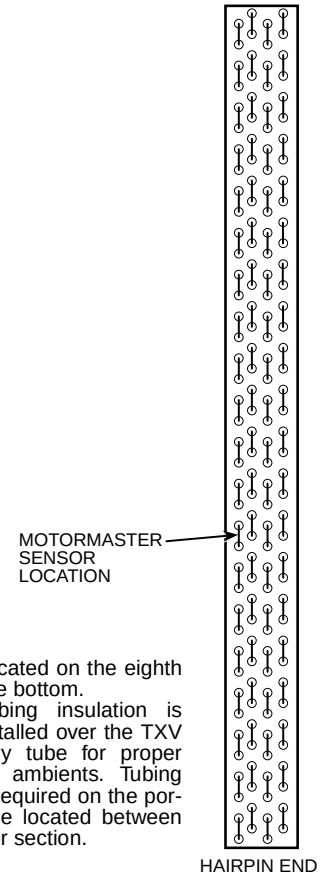
Accessory 0° F Low Ambient Kit — Install the Accessory 0° F Low Ambient Kit per instruction supplied with accessory.

Sensor Assembly — Install the sensor assembly in the location shown in Fig. 19.

Motor Mount — To ensure proper fan height, replace the existing motor mount with the new motor mount provided with accessory.

Transformer (460 and 575-v Units Only) — On 460 and 575-volt units a transformer is required. The transformer is provided with the accessory and must be field installed.

Motormaster I Control — Recommended mounting location is on the inside of the panel to the left of the control box. The control should be mounted on the inside of the panel, vertically, with leads protruding from bottom of extrusion.



NOTES:
1. All sensors are located on the eighth hairpin up from the bottom.
2. Field-installed tubing insulation is required to be installed over the TXV bulb and capillary tube for proper operation at low ambients. Tubing insulation is only required on the portion of suction line located between indoor and outdoor section.

Fig. 19 — Motormaster® I Sensor Locations

Step 10 — Adjust Factory-Installed Options

PREMIERLINK™ CONTROL — The PremierLink controller is available as a special order from the factory and is compatible with the Carrier Comfort Network® (CCN) system. This control is designed to allow users the access and ability to change factory-defined settings, thus expanding the function of the standard unit control board. Carrier's diagnostic standard tier display tools such as Navigator™ device or Scrolling Marquee can be used with the PremierLink controller.

The PremierLink controller (see Fig. 20) requires the use of a Carrier electronic thermostat or a CCN connection for time broadcast to initiate its internal timeclock. This is necessary for broadcast of time of day functions (occupied/unoccupied). No sensors are supplied with the field-mounted PremierLink control. The factory-installed PremierLink control includes only the supply-air temperature (SAT) sensor and the outdoor air temperature (OAT) sensor as standard. An indoor air quality (CO_2) sensor can be added as an option. Refer to Table 4 for sensor usage. Refer to Fig. 21 for PremierLink controller wiring. The PremierLink control may be mounted in the control panel or an area below the control panel.

NOTE: PremierLink controller version 1.3 and later is shipped in Sensor mode. If used with a thermostat, the PremierLink controller must be configured to Thermostat mode.

Install the Supply Air Temperature (SAT) Sensor — When the unit is supplied with a factory-mounted PremierLink control, the supply-air temperature (SAT) sensor (33ZCSENSAT) is factory-supplied and wired. The wiring is routed from the PremierLink control over the control box, through a grommet, into the fan section, down along the back side of the fan, and along the fan deck over to the supply-air opening.

The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a $^1/_2$-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation.

NOTE: The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit or heat surfaces.

Outdoor Air Temperature (OAT) Sensor — When the unit is supplied with a factory-mounted PremierLink control, the outdoor-air temperature sensor (OAT) is factory-supplied and wired.

Install the Indoor Air Quality (CO_2) Sensor — Mount the optional indoor air quality (CO_2) sensor according to manufacturer specifications. A separate field-supplied transformer must be used to power the CO_2 sensor.

Wire the CO_2 sensor to the COM and IAQI terminals of J5 on the PremierLink controller. Refer to the PremierLink Installation, Start-up, and Configuration Instructions for detailed wiring and configuration information.

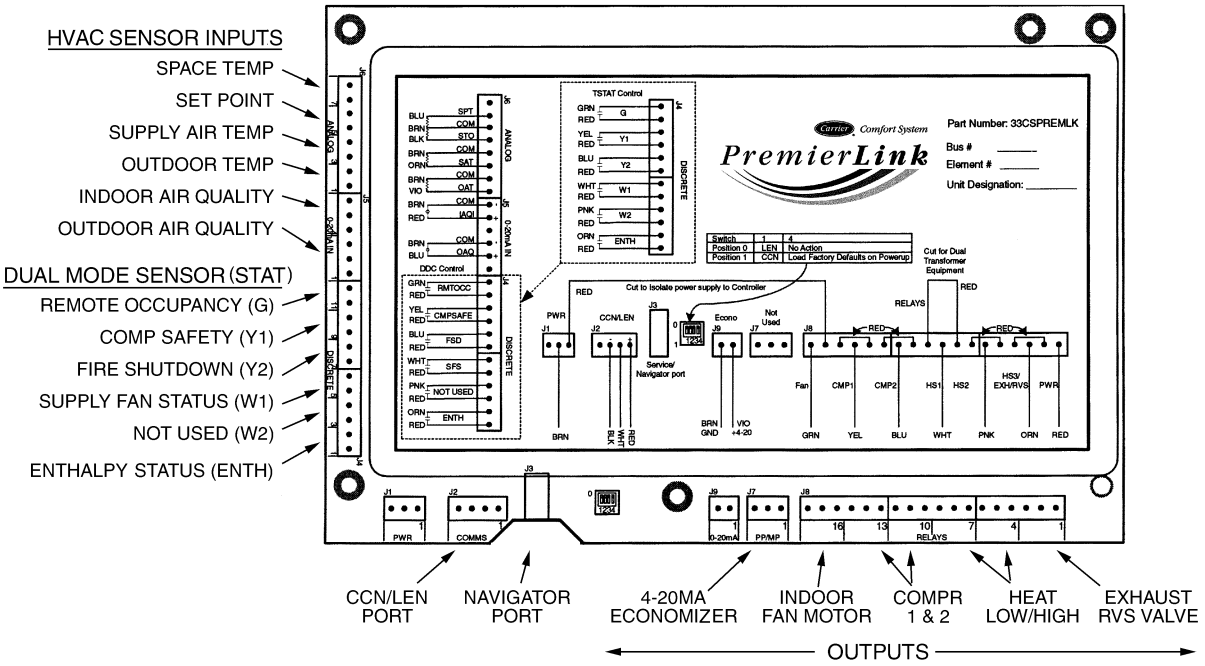
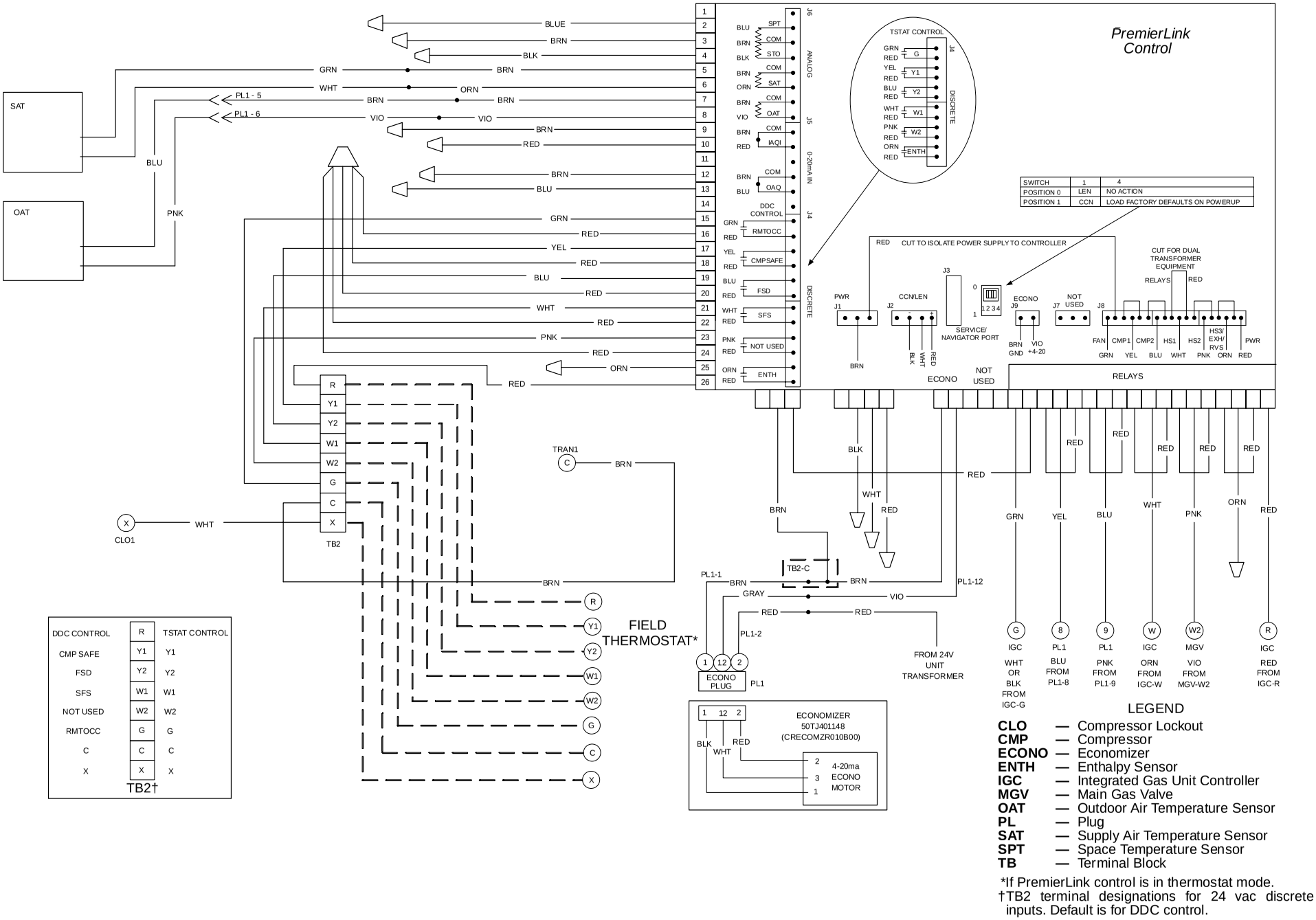


Fig. 20 — PremierLink™ Controller



LEGEND

CLO — Compressor Lockout
CMP — Compressor
ECONO — Economizer
ENTH — Enthalpy Sensor
IGC — Integrated Gas Unit Controller
MGV — Main Gas Valve
OAT — Outdoor Air Temperature Sensor
PL — Plug
SAT — Supply Air Temperature Sensor
SPT — Space Temperature Sensor
TB — Terminal Block

*If PremierLink control is in thermostat mode.
†TB2 terminal designations for 24 vac discrete inputs. Default is for DDC control.

Fig. 21 — PremierLink™ Controls Wiring

Table 4 — PremierLink™ Sensor Usage

APPLICATION	OUTDOOR AIR TEMPERATURE SENSOR	RETURN AIR TEMPERATURE SENSOR	OUTDOOR AIR ENTHALPY SENSOR	RETURN AIR ENTHALPY SENSOR
Differential Dry Bulb Temperature with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — HH79NZ039	Required — 33ZCT55SPT or Equivalent	—	—
Single Enthalpy with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — Not Used	—	Required — 33CSENTHSW or HH57AC077	—
Differential Enthalpy with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — Not Used	—	Required — 33CSENTHSW (HH57ZC003) or HH57AC077	Required — 33CSENTSEN or HH57AC078

*PremierLink control requires Supply Air Temperature sensor 33ZCSENSAT and Outdoor Air Temperature sensor HH79NZ039 — Included with factory-installed PremierLink control; field-supplied and field-installed with field-installed PremierLink control.

NOTES:
1. CO_2 Sensors (Optional):
   33ZCSENCO2 — Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.
   33ZCASPCO2 — Aspirator box used for duct-mounted CO_2 room sensor.
   33ZCT55CO2 — Space temperature and CO_2 room sensor with override.
   33ZCT56CO2 — Space temperature and CO_2 room sensor with override and setpoint.
2. All units include the following Standard Sensors:
   Outdoor-Air Sensor — 50HJ540569 — Opens at 67 F, closes at 52 F, not adjustable.
   Mixed-Air Sensor — HH97AZ001 — (PremierLink control requires Supply Air Temperature sensor 33ZCSENSAT and Outdoor Air Temperature Sensor HH79NZ039)
   Compressor Lockout Sensor — 50HJ540570 — Opens at 35 F, closes at 50 F.

ENTHALPY SWITCH/RECEIVER — The accessory enthalpy switch/receiver (33CSENTHSW) senses temperature and humidity of the air surrounding the device and calculates the enthalpy when used without an enthalpy sensor. The relay is energized when enthalpy is high and deenergized when enthalpy is low (based on ASHRAE [American Society of Heating, Refrigeration and Air Conditioning Engineers] 90.1 criteria). If an accessory enthalpy sensor (33CSENTSEN) is attached to the return air sensor input, then differential enthalpy is calculated. The relay is energized when the enthalpy detected by the return air enthalpy sensor is less than the enthalpy at the enthalpy switch/receiver. The relay is deenergized when the enthalpy detected by the return air enthalpy sensor is greater than the enthalpy at the enthalpy switch/receiver (differential enthalpy control). See Fig. 22 and 23.

OUTDOOR ENTHALPY CONTROL (Fig. 24) — Outdoor enthalpy control requires only an enthalpy switch/receiver (33CSENTHSW). The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy switch/receiver energizes the relay output when the outdoor enthalpy is above 28 BTU/lb **OR** dry bulb temperature is above 75 F and is deenergized when the outdoor enthalpy is below 27 BTU/lb **AND** dry bulb temperature is below 74.5 F. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

Mounting — Mount the enthalpy switch/receiver in a location where the outdoor air can be sampled (such as the outdoor air intake). The enthalpy switch/receiver is not a NEMA 4 (National Electrical Manufacturers Association) enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy switch/receiver.

Wiring — Carrier recommends the use of 18 to 22 AWG (American Wire Gage) twisted pair or shielded cable for all wiring. All connections must be made with $^1/_4$-in. female spade connectors.

A 24-vac transformer is required to power the enthalpy switch/receiver; as shown in Fig. 24, the PremierLink™ board provides 24 vac. Connect the GND and 24 VAC terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthalpy switch/receiver to the red and brown wires (1 and 4) on the economizer harness.

For connection to rooftop units with PremierLink™ control, connect the LOW Enthalpy terminal on the enthalpy switch/receiver to J4 — pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board if desired. Wire the 24 VAC terminal on the enthalpy switch/receiver to J4 — pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1 — pin 2 on the PremierLink control. The HI Enthalpy terminal is not used. See Fig. 24.

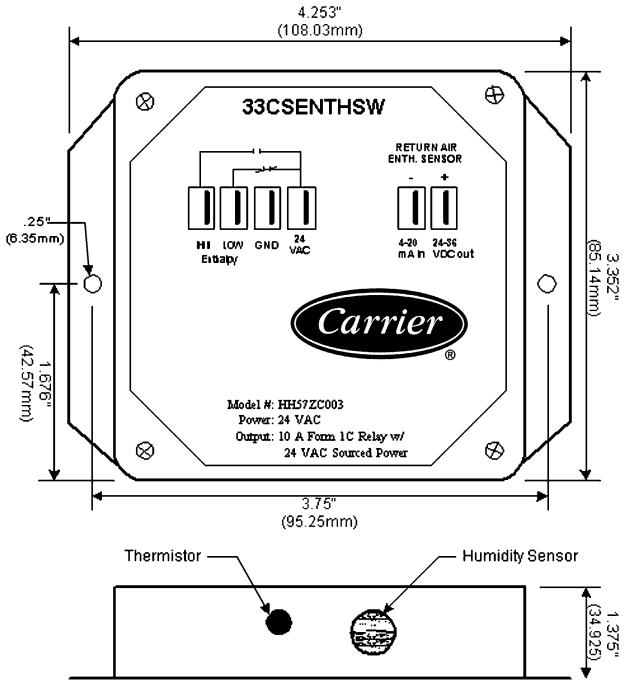


Fig. 22 — Enthalpy Switch/Receiver Dimensions (33CSENTHSW)

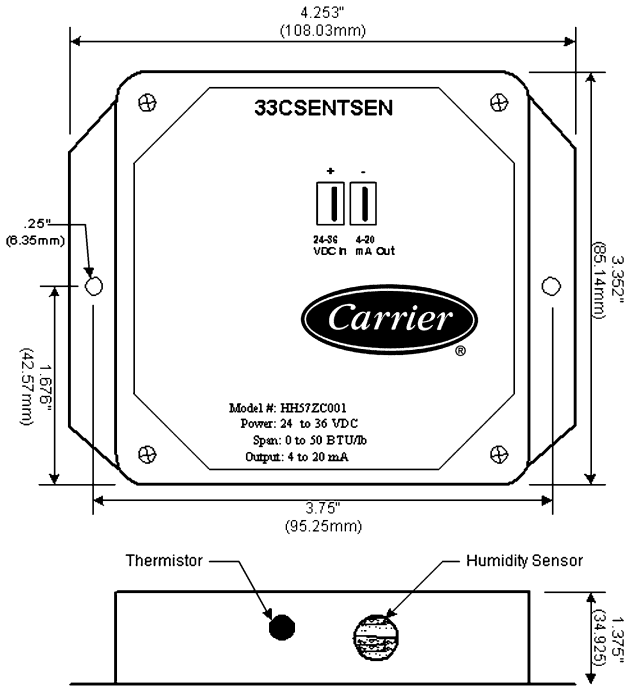
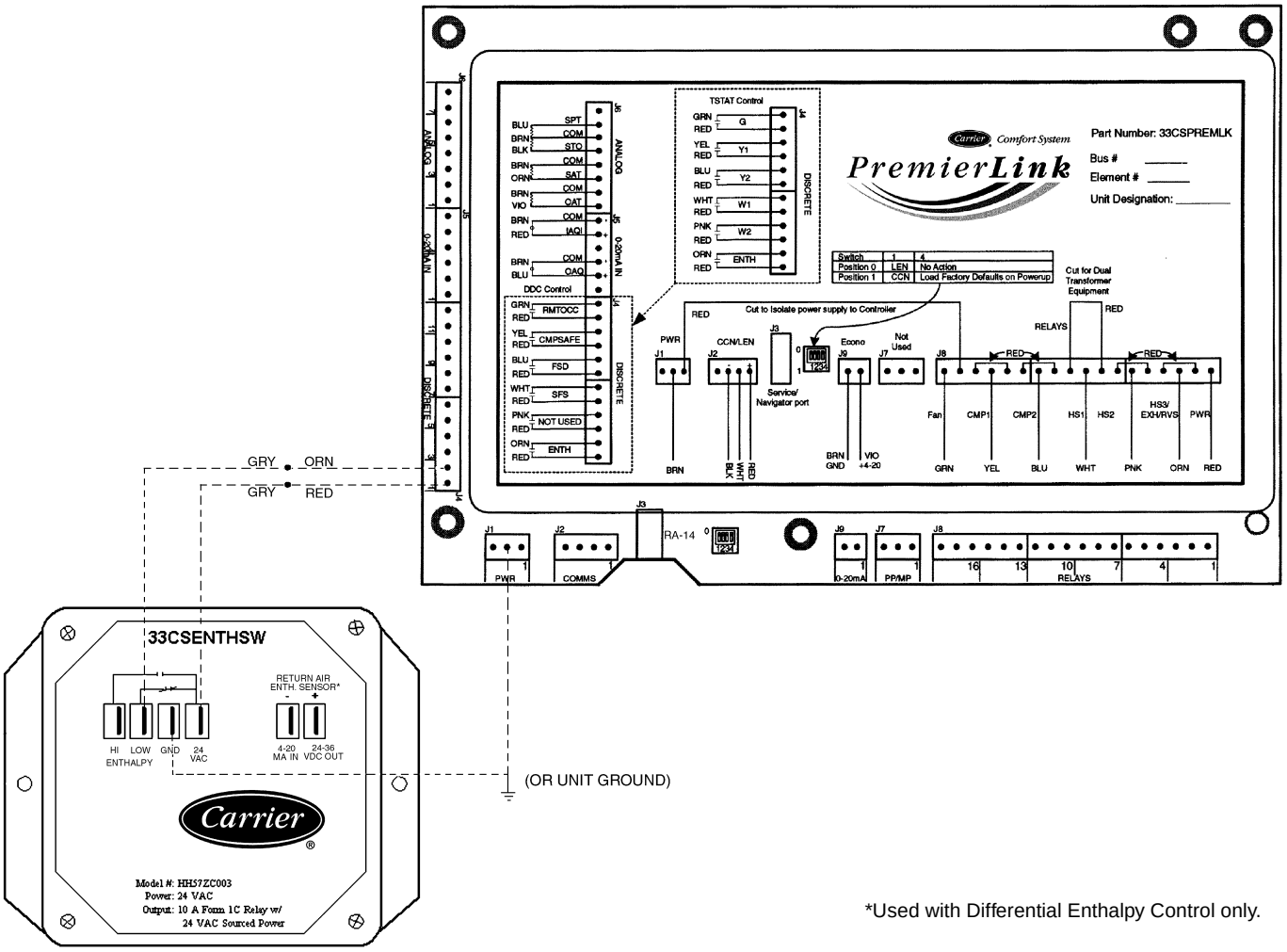


Fig. 23 — Enthalpy Sensor Dimensions (33CSENTSEN)



*Used with Differential Enthalpy Control only.

Fig. 24 — Typical Wiring Schematic — Carrier Rooftop Unit with PremierLink™ Controls

DIFFERENTIAL ENTHALPY CONTROL (Fig. 25) — Differential enthalpy control requires both an enthalpy switch/receiver (33CSENTHSW) and an enthalpy sensor (33CSENTSEN). The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy sensor is mounted in the return airstream and calculates the enthalpy of the indoor air.

The enthalpy switch/receiver energizes the HI Enthalpy relay output when the outdoor enthalpy is greater than the indoor enthalpy. The LOW Enthalpy terminal is energized when the outdoor enthalpy is lower than the indoor enthalpy. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

Mounting — Mount the enthalpy switch/receiver in a location where the outdoor air can be sampled (such as the outdoor air intake). The enthalpy switch/receiver is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain, snow, or direct sunlight. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy switch/receiver.

Mount the enthalpy sensor in a location where the indoor air can be sampled (such as the return air duct). The enthalpy sensor is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy sensor.

Wiring — Carrier recommends the use of 18 to 22 AWG twisted pair or shielded cable for all wiring. All connections must be made with $^1/_4$-in. female spade connectors.

The PremierLink™ board provides 24-vac to power the enthalpy switch/receiver. Connect the GND and 24 VAC terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthalpy switch/receiver to the red and brown wires (1 and 4) on the economizer harness.

Connect the LOW Enthalpy terminal on the enthalpy switch/receiver to J4 — pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board if desired. Wire the 24 VAC terminal on the enthalpy switch/receiver to J4 — pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1 — pin 2 on the PremierLink control. The HI Enthalpy terminal is not used. See Fig. 24.

Connect the 4-20 mA IN terminal on the enthalpy switch/receiver to the 4-20 mA OUT terminal on the return air enthalpy sensor. Connect the 24-36 VDC OUT terminal on the enthalpy switch/receiver to the 24-36 VDC IN terminal on the return air enthalpy sensor. See Fig. 25.

Enthalpy Switch/Receiver Jumper Settings — There are two jumpers. One jumper determines the mode of the enthalpy switch/receiver. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy switch/receiver and then remove the cover. The factory settings for the jumpers are M1 and OFF.

The mode jumper should be set to M2 for differential enthalpy control. The factory test jumper should remain on OFF or the enthalpy switch/receiver will not calculate enthalpy.

Enthalpy Sensor Jumper Settings — There are two jumpers. One jumper determines the mode of the enthalpy sensor. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy sensor and then remove the cover. The factory settings for the jumpers are M3 and OFF.

The mode jumper should be set to M3 for 4 to 20 mA output. The factory test jumper should remain on OFF or the enthalpy sensor will not calculate enthalpy.

ENTHALPY SENSORS AND CONTROL — The enthalpy control (HH57AC077) is supplied as a field-installed accessory to be used with the EconoMi$er2 damper control option. The outdoor air enthalpy sensor is part of the enthalpy control. The separate field-installed accessory return air enthalpy sensor (HH57AC078) is required for differential enthalpy control.

NOTE: The enthalpy control must be set to the "D" setting for differential enthalpy control to work properly.

The enthalpy control receives the indoor and return enthalpy from the outdoor and return air enthalpy sensors and provides a dry contact switch input to the PremierLink™ controller. Locate the controller in place of an existing economizer controller or near the actuator. The mounting plate may not be needed if existing bracket is used.

A closed contact indicates that outside air is preferred to the return air. An open contact indicates that the economizer should remain at minimum position.

Outdoor Air Enthalpy Sensor/Enthalpy Controller (HH57AC077) — To wire the outdoor air enthalpy sensor, perform the following (see Fig. 26 and 27):

NOTE: The outdoor air sensor can be removed from the back of the enthalpy controller and mounted remotely.

1. Use a 4-conductor, 18 or 20 AWG cable to connect the enthalpy control to the PremierLink controller and power transformer.
2. Connect the following 4 wires from the wire harness located in rooftop unit to the enthalpy controller:
   a. Connect the BRN wire to the 24 vac terminal (TR1) on enthalpy control and to pin 1 on 12-pin harness.
   b. Connect the RED wire to the 24 vac GND terminal (TR) on enthalpy sensor and to pin 4 on 12-pin harness.
   c. Connect the GRAY/ORN wire to J4-2 on PremierLink controller and to terminal (3) on enthalpy sensor.
   d. Connect the GRAY/RED wire to J4-1 on PremierLink controller and to terminal (2) on enthalpy sensor.

NOTE: If installing in a Carrier rooftop, use the two gray wires provided from the control section to the economizer to connect PremierLink controller to terminals 2 and 3 on enthalpy sensor.

Return Air Enthalpy Sensor — Mount the return-air enthalpy sensor (HH57AC078) in the return-air duct. The return air sensor is wired to the enthalpy controller (HH57AC077). The outdoor enthalpy changeover set point is set at the controller.

To wire the return air enthalpy sensor, perform the following (see Fig. 26):

1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. At the enthalpy control remove the factory-installed resistor from the (SR) and (+) terminals.
3. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (SR+) terminal on the enthalpy controller. Connect the BLK wire to (S) spade connector on the return air enthalpy sensor and the (SR) terminal on the enthalpy controller.

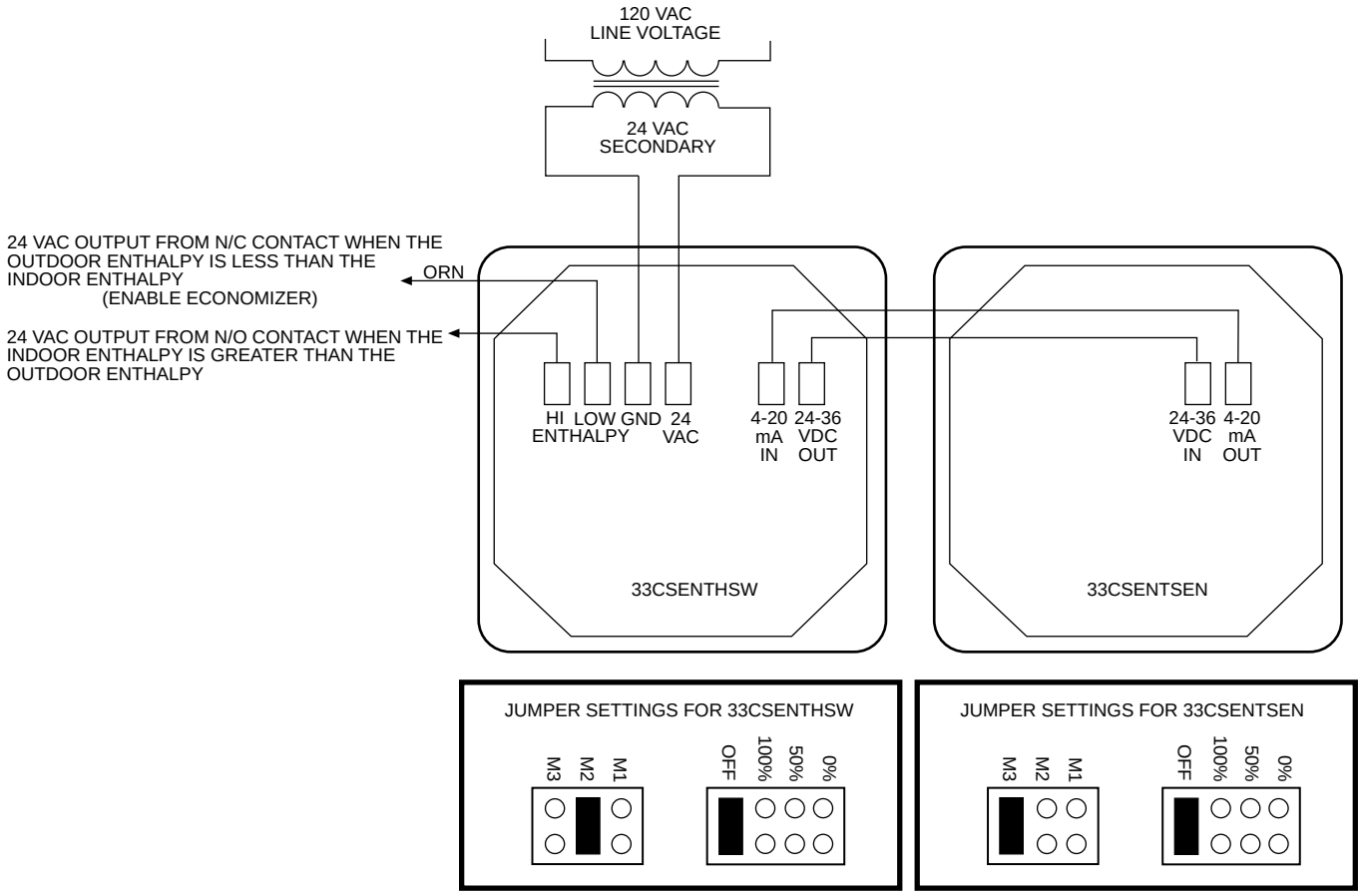
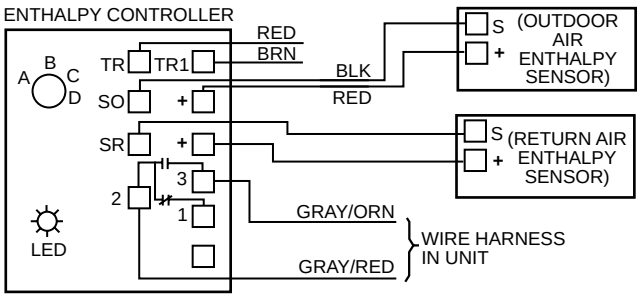


Fig. 25 — Differential Enthalpy Control Wiring



NOTES:
1. Remove factory-installed jumper across SR and + before connecting wires from return air sensor.
2. Switches shown in high outdoor air enthalpy state. Terminals 2 and 3 close on low outdoor air enthalpy relative to indoor air enthalpy.
3. Remove sensor mounted on back of control and locate in outside airstream.

Fig. 26 — Outdoor and Return Air Sensor Wiring Connections for Differential Enthalpy Control

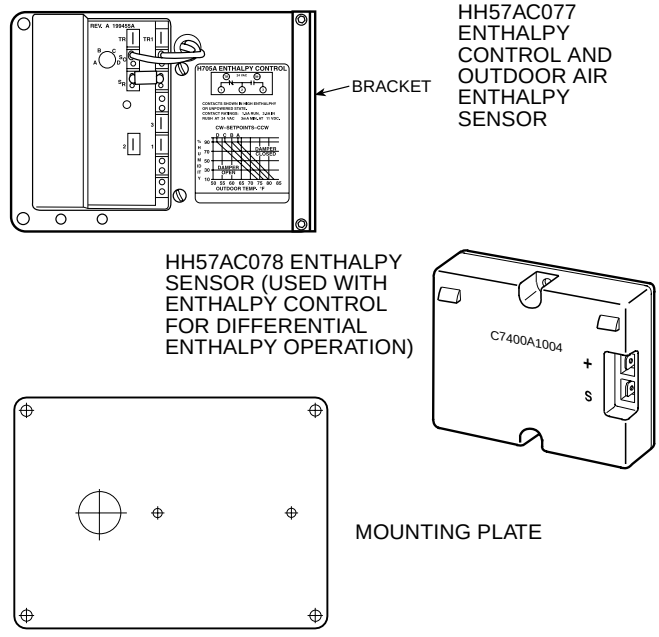


Fig. 27 — Differential Enthalpy Control, Sensor and Mounting Plate (33AMKITENT006)

OPTIONAL ECONOMI$ERIV AND ECONOMI$ER2 — See Fig. 28 and 29 for EconoMi$erIV component locations. See Fig. 30 for EconoMi$er2 component locations.

NOTE: These instructions are for installing the optional EconoMi$erIV and EconoMi$er2 only. Refer to the accessory EconoMi$erIV or EconoMi$er2 installation instructions when field installing an EconoMi$erIV or EconoMi$er2 accessory.

To complete installation of the optional EconoMi$erIV, perform the following procedure.

1. Remove the EconoMi$erIV hood. Refer to Step 8 — Install Outdoor-Air Hood on page 10 for information on removing and installing the outdoor-air hood.
2. Relocate outdoor air temperature sensor from shipping position to operation position on EconoMi$erIV. See Fig. 28.

IMPORTANT: Failure to relocate the sensor will result in the EconoMi$erIV not operating properly.

3. Reinstall economizer hood.
4. Install all EconoMi$erIV accessories. EconoMi$erIV wiring is shown in Fig. 31. EconoMi$er2 wiring is shown in Fig. 32.

Outdoor air leakage is shown in Table 5. Return air pressure drop is shown in Table 6.

Table 5 — Outdoor Air Damper Leakage

	DAMPER STATIC PRESSURE (in. wg)					
	0.2	0.4	0.6	0.8	1.0	1.2
LEAKAGE (Cfm)	35	53	65	75	90	102

Table 6 — Return Air Pressure Drop (in. wg)

AIRFLOW (Cfm)					
4500	5000	5400	6000	7200	7500
0.040	0.050	0.060	0.070	0.090	0.100

ECONOMI$ERIV STANDARD SENSORS

Outdoor Air Temperature (OAT) Sensor — The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$erIV can be used for free cooling. The sensor must be field-relocated. The operating range of temperature measurement is 40 to 100 F.

Supply Air Temperature (SAT) Sensor — The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 29. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F. See Table 7 for sensor temperature/resistance values.

The temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located in the "crimp end" and is sealed from moisture.

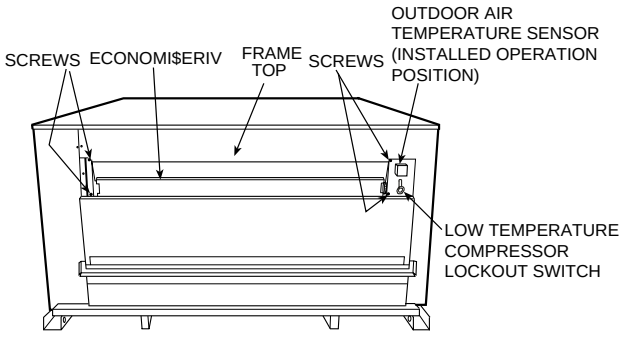


Fig. 28 — EconoMi$erIV Component Locations — End View

Table 7 — Supply Air Sensor Temperature/ Resistance Values

TEMPERATURE (F)	RESISTANCE (ohms)
–58	200,250
–40	100,680
–22	53,010
–4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

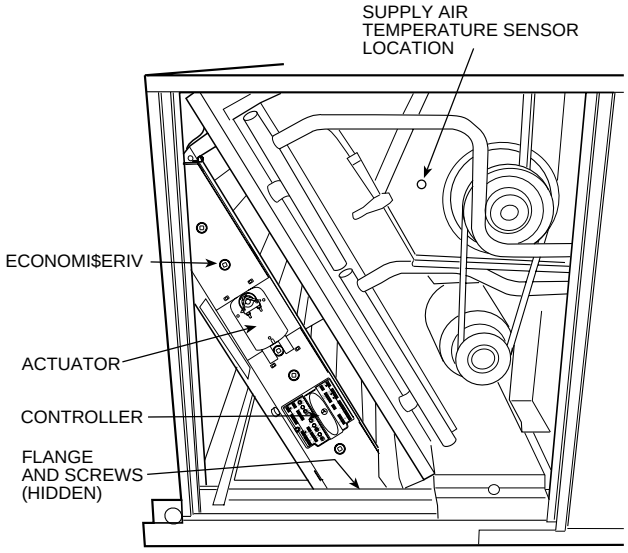


Fig. 29 — EconoMi$erIV Component Locations — Side View

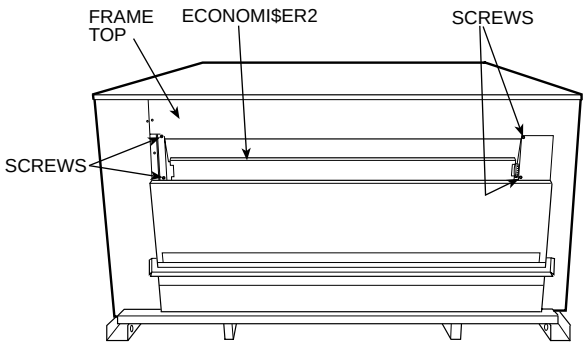
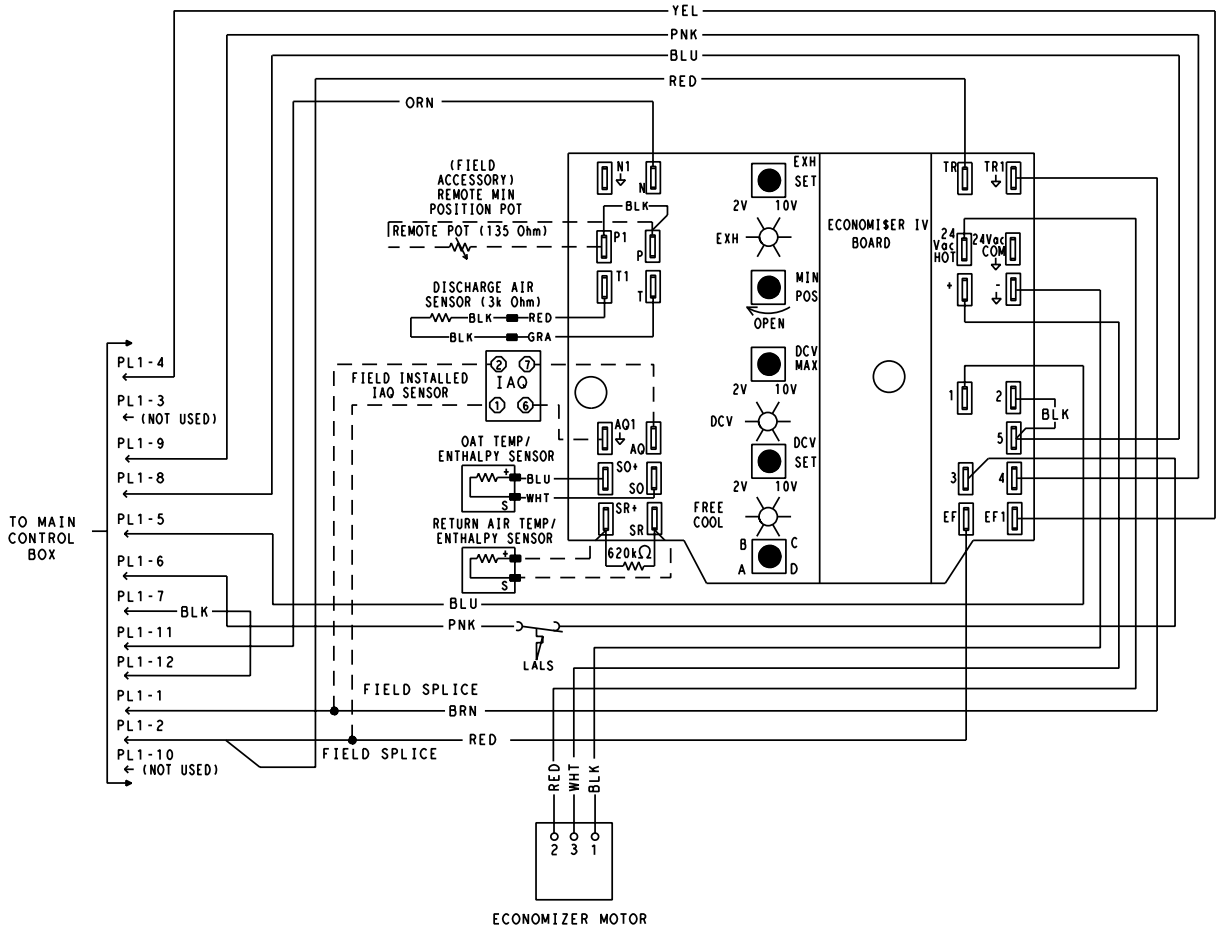


Fig. 30 — EconoMi$er2 Component Locations



LEGEND

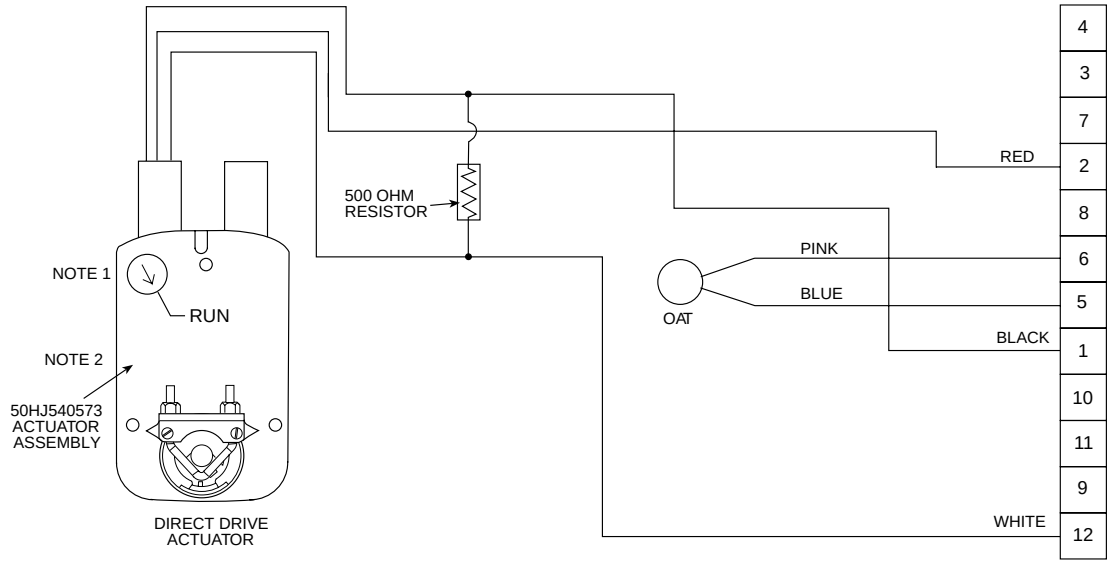
DCV — Demand Controlled Ventilation
IAQ — Indoor Air Quality
LALS — Low Temperature Compressor Lockout Switch
OAT — Outdoor-Air Temperature
POT — Potentiometer

Potentiometer Default Settings:

Power Exhaust	Middle
Minimum Pos.	Fully Closed
DCV Max.	Middle
DCV Set	Middle
Enthalpy	C Setting

NOTES:
1. 620 ohm, 1 watt 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. If a separate field-supplied 24 v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
3. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

Fig. 31 — EconoMi$erIV Wiring



LEGEND

OAT — Outdoor Air Temperature Sensor

NOTES:
1. Switch on actuator must be in run position for economizer to operate.
2. 50HJ540573 actuator consists of the 50HJ540567 actuator and a harness with 500-ohm resistor.

Fig. 32 — EconoMi$er2 Wiring

Low Temperature Compressor Lockout Switch — The EconoMi$erIV is equipped with an ambient temperature lockout switch located in the outdoor airstream which is used to lockout the compressors below a 42 F ambient temperature. See Fig. 28.

ECONOMI$ERIV CONTROL MODES

IMPORTANT: The optional EconoMi$er2 does not include a controller. The EconoMi$er2 is operated by a 4 to 20 mA signal from an existing field-supplied controller (such as PremierLink™ control). See Fig. 32 for wiring information.

Determine the EconoMi$erIV control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 8. The EconoMi$erIV is supplied from the factory with a supply air temperature sensor (a low temperature compressor lockout switch) and an outdoor air temperature sensor. This allows for operation of the EconoMi$erIV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$erIV and unit.

Table 8 — EconoMi$erIV Sensor Usage

APPLICATION	ECONOMI$ERIV WITH OUTDOOR AIR DRY BULB SENSOR		
	Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.		
Differential Dry Bulb	CRTEMPSN002A00*		
Single Enthalpy	HH57AC078		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*		
CO_2 for DCV Control using a Wall-Mounted CO_2 Sensor	33ZCSENCO2		
CO_2 for DCV Control using a Duct-Mounted CO_2 Sensor	33ZCSENCO2† and 33ZCASPCO2**	OR	CRCBDIOX005A00††

*CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.
†33ZCSENCO2 is an accessory CO_2 sensor.
**33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.
††CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

Outdoor Dry Bulb Changeover — The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$erIV will adjust the outdoor-air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor-air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. See Fig. 33. The scale on the potentiometer is A, B, C, and D. See Fig. 34 for the corresponding temperature changeover values.

Differential Dry Bulb Control — For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory return air sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 35.

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the free cooling/enthalpy set point potentiometer fully clockwise to the D setting. See Fig. 33.

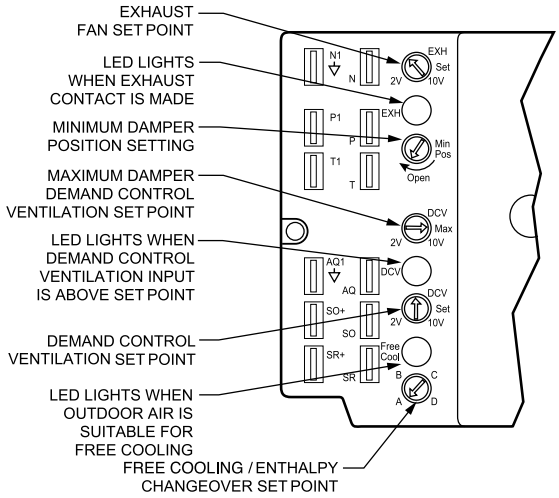


Fig. 33 — EconoMi$erIV Controller Potentiometer and LED Locations

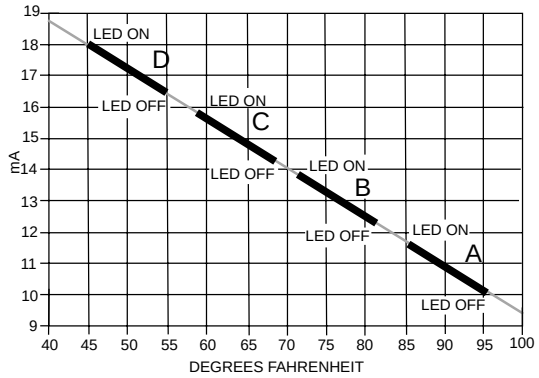


Fig. 34 — Outside Air Temperature Changeover Set Points

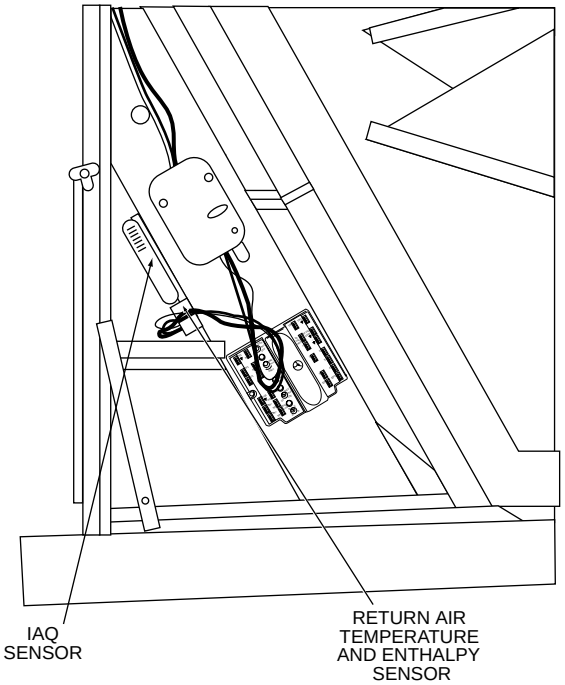


Fig. 35 — Return Air Temperature or Enthalpy Sensor Mounting Location

Outdoor Enthalpy Changeover — For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 28. When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$erIV controller. The set points are A, B, C, and D. See Fig. 36. The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMi$erIV controller. See Fig. 31 and 37.

Differential Enthalpy Control — For differential enthalpy control, the EconoMi$erIV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return airstream on the EconoMi$erIV frame. The EconoMi$erIV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$erIV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air and is below the set point, the EconoMi$erIV opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 28. Mount the return air enthalpy sensor in the return airstream. See Fig. 35. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$erIV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

NOTE: Remove 620-ohm resistor if differential enthalpy sensor is installed.

Indoor Air Quality (IAQ) Sensor Input — The IAQ input can be used for demand control ventilation control based on the level of CO_2 measured in the space or return air duct.

Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. See Fig. 38.

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi$erIV control board will be damaged.

Exhaust Set Point Adjustment — The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 33. The set point represents the damper position above which the exhaust fan will be turned on. When there is a call for exhaust, the EconoMi$erIV controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

CONTROL CURVE	CONTROL POINT APPROX. °F (°C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

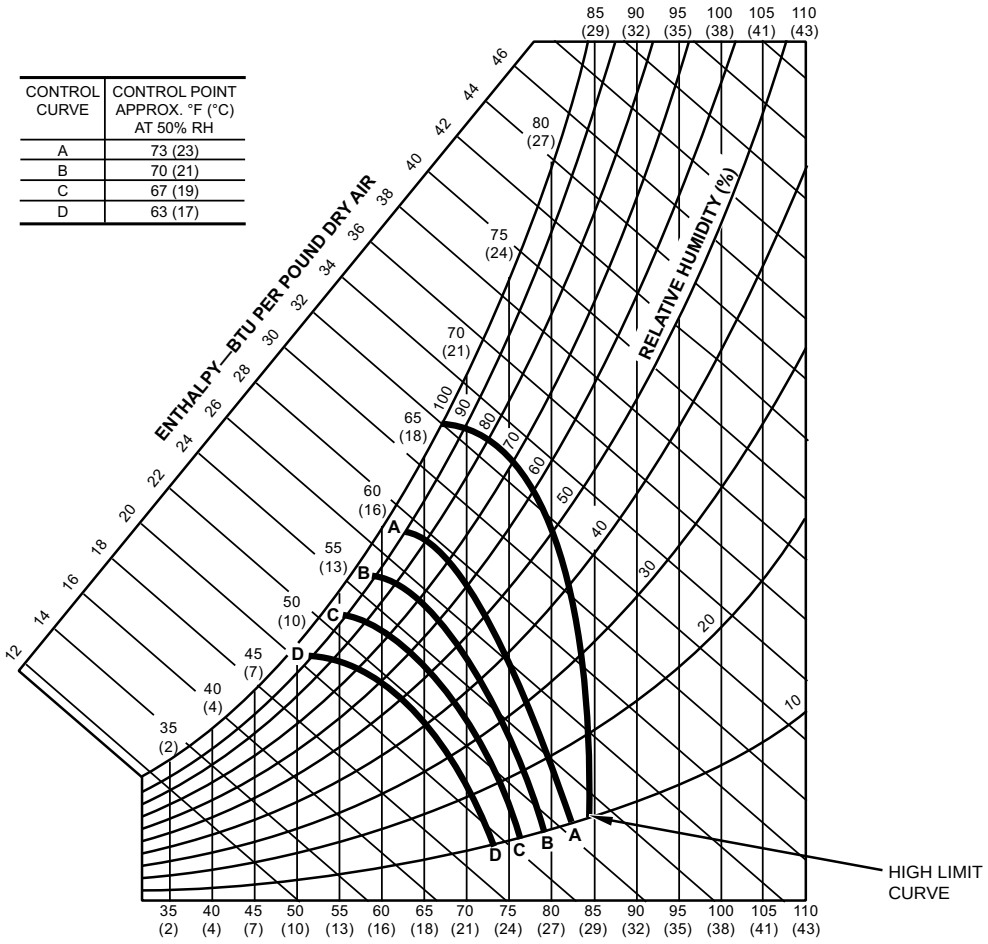


Fig. 36 — Enthalpy Changeover Set Points

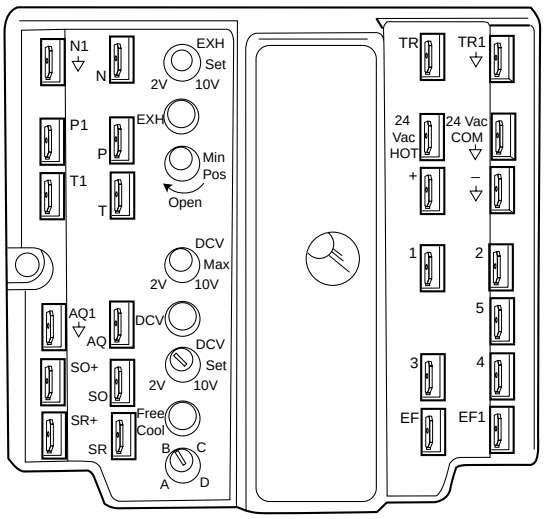


Fig. 37 — EconoMi$erIV Controller

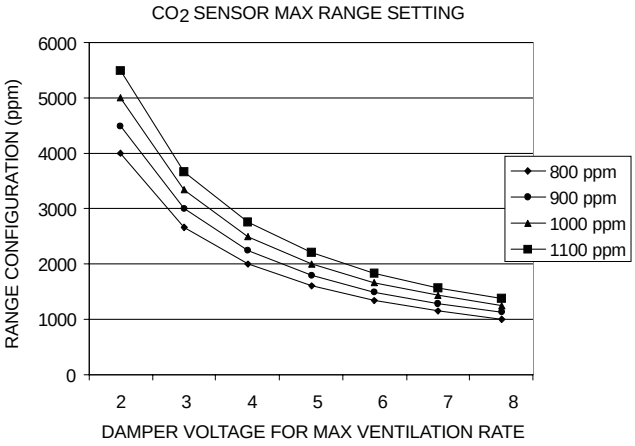


Fig. 38 — CO_2 Sensor Maximum Range Setting

Minimum Position Control — There is a minimum damper position potentiometer on the EconoMi$erIV controller. See Fig. 33. The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compound) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10° F temperature difference between the outdoor and return-air temperatures.

To determine the minimum position setting, perform the following procedure:

1. Calculate the appropriate mixed-air temperature using the following formula:

$$(T_O \times \frac{OA}{100}) + (TR \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature
OA = Percent of Outdoor Air
T_R = Return-Air Temperature
RA = Percent of Return Air
T_M = Mixed-Air Temperature

As an example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60 F, and return-air temperature is 75 F.

(60 x .10) + (75 x .90) = 73.5 F

2. Disconnect the supply-air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 31 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed-air temperature matches the calculated value.
6. Reconnect the supply air sensor to terminals T and T1.

Remote control of the EconoMi$erIV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi$erIV controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the EconoMi$erIV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi$erIV controller. See Fig. 37.

Damper Movement — Damper movement from full open to full closed (or vice versa) takes $2^1/_2$ minutes.

Thermostats — The EconoMi$erIV control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The EconoMi$erIV control does not support space temperature sensors. Connections are made at the thermostat terminal connection board located in the main control box.

Occupancy Control — The factory default configuration for EconoMi$erIV control is occupied mode. This is implemented by the RED jumper at TB2-9 to TB2-10. When unoccupied mode is desired, remove the RED jumper and install a field-supplied timeclock function between TB2-9 and TB2-10. When the timeclock contacts are open, the unit control will be in unoccupied mode; when the contacts are closed, the unit control will be in occupied mode.

Demand Controlled Ventilation (DCV) — When using the EconoMi$erIV for demand controlled ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5 to 10% more than the typical cfm required per person, using normal outside air design criteria.

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO_2

level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

$$(T_O \times \frac{OA}{100}) + (TR \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature
OA = Percent of Outdoor Air
T_R = Return-Air Temperature
RA = Percent of Return Air
T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 38 to determine the maximum setting of the CO_2 sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 38 to find the point when the CO_2 sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO_2 sensor should be 1800 ppm. The EconoMi$erIV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$erIV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position. Do not set to the maximum position as this can result in over-ventilation to the space and potential high-humidity levels.

CO_2 Sensor Configuration — The CO_2 sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 9.

Use setting 1 or 2 for Carrier equipment. See Table 9.

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to select the preset number. See Table 9.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO_2 sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Dehumidification of Fresh Air with DCV Control — Information from ASHRAE indicates that the largest humidity load on any zone is the fresh air introduced. For some applications, a field-supplied energy recovery unit can be added to reduce the moisture content of the fresh air being brought into the building when the enthalpy is high. In most cases, the normal heating and cooling processes are more than adequate to remove the humidity loads for most commercial applications.

If normal rooftop heating and cooling operation is not adequate for the outdoor humidity level, an energy recovery unit and/or a dehumidification option should be considered.

Table 9 — CO_2 Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO_2 CONTROL RANGE (ppm)	OPTIONAL RELAY SETPOINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface with Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 7-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0- 900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0- 900	900	50
8	Health & Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

LEGEND
ppm — Parts Per Million

Step 11 — Set Defrost Cycle — The defrost timer is factory set at 30 minutes. The timer may be field-adjusted to 50 or 90 minutes by moving the wire from the 30-minute contact to the 50 or 90 minute contact. At the end of the time period, the defrost cycle will begin. See Fig. 39.

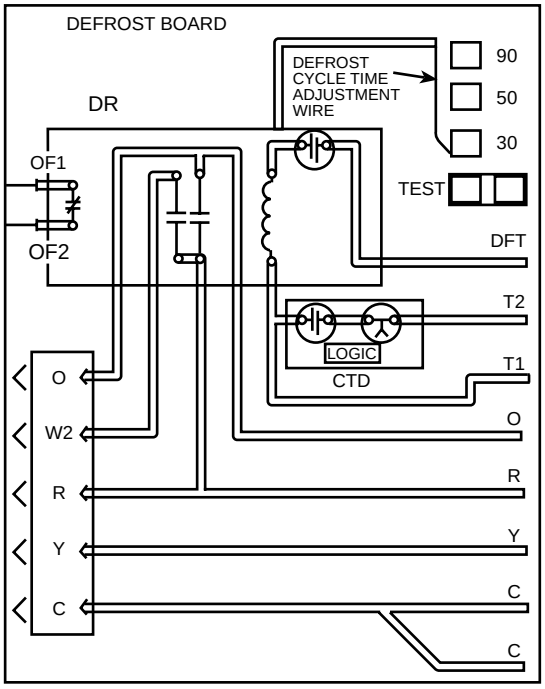


Fig. 39 — Defrost Board Timer Wiring

START-UP

Use the following information and complete Start-Up Checklist on page CL-1 to check out unit PRIOR to start-up.

Unit Preparation — Check that unit has been installed in accordance with these installation instructions and all applicable codes.

COMPRESSOR MOUNTING — Loosen compressor holddown bolts until sideways movement of the washer under each holddown bolt head can be obtained. Do not loosen completely, as bolts are self-locking and will maintain adjustment.

INTERNAL WIRING — Check all electrical connections in unit control boxes; tighten as required.

REFRIGERANT SERVICE PORTS AND VALVES — Each 50HJQ unit has 2 Schrader-type service ports per circuit; one on the suction line and one on the liquid line. Be sure that caps on the ports are tight. The units also have 2 service valves per circuit; one on the suction line and one on the discharge line. Be sure all valves are open.

CRANKCASE HEATERS — Heaters are energized as long as there is power to unit.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

INDOOR FAN — Fan belt and pulleys are factory installed. Remove tape from the fan pulley and adjust pulleys on 50HJQ014 units as required. See Indoor-Fan, 50HJQ014 Units section on page 31. See Table 10 for air quantity limits. See Tables 11A, 11B, and 12 for fan performance data. Be sure that fans rotate in the proper direction. See Table 13 for static pressure drops for accessories and options. See Fig. 40 for fan performance using horizontal adapter. See Table 14 for fan rpm pulley settings. See Table 15 for indoor-fan motor performance data. To alter fan performance, see Indoor-Fan, 50HJQ014 Units and Indoor-Fan, 50HJQ016 Units sections, page 32.

Table 10 — Air Quantity Limits

UNIT 50HJQ	MINIMUM CFM	MAXIMUM CFM
014	3750	6250
016	4500*	7500

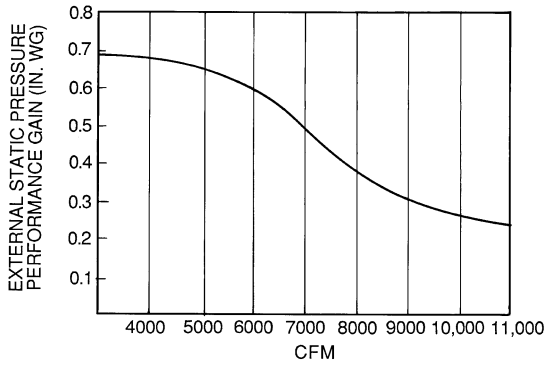
*Minimum cfm is 5600 when electric heater is used.

GLYCOL HYDRONIC COILS — Glycol coil is intended for add-on type applications or new work where a boiler system is available. Glycol coil and electric heat cannot be installed together. Refer to Tables 16 and 17 for glycol coil data and ratings.

OUTDOOR FANS AND MOTORS — Fans and motors are factory set. Refer to Outdoor-Fan Adjustment section on page 33 as required.

RETURN-AIR FILTERS — Check that correct filters are installed in filter tracks. See Table 1. Do not operate unit without return-air filters.

OUTDOOR-AIR INLET SCREENS — Outdoor-air inlet screens must be in place before operating unit.



NOTE: The CRRFCURB013A00 horizontal supply and return adapter accessory improves 50HJQ fan performance by increasing external static pressure by amount shown above.

Fig. 40 — Horizontal Supply/Return Fan Performance with CRRFCURB013A00 High-Static Regain Adapter

Table 11A — Fan Performance Data, 50HJQ014; 208/230, 460 V Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	**724**	**481**	**0.55**	**838**	**685**	**0.78**	937	889	1.01	1028	1097	1.25	1111	1309	1.49
4000	**754**	**613**	**0.70**	865	824	0.94	962	1034	1.18	1050	1247	1.42	1131	1463	1.67
4250	**786**	**757**	**0.86**	893	975	1.11	987	1191	1.36	1073	1408	1.60	**1152**	**1629**	**1.86**
4500	**818**	**914**	**1.04**	922	1138	1.30	1013	1360	1.55	1097	1583	1.80	**1174**	**1808**	**2.06**
4750	**850**	**1084**	**1.23**	951	1313	1.50	1040	1541	1.76	1122	1770	2.02	**1197**	**2000**	**2.28**
5000	883	1267	1.44	980	1501	1.71	1068	1736	1.98	**1147**	**1969**	**2.24**	**1221**	**2204**	**2.51**
5250	917	1464	1.67	1011	1703	1.94	1096	1943	2.21	**1174**	**2183**	**2.49**	**1246**	**2423**	**2.76**
5500	950	1675	1.91	1041	1918	2.19	1124	2165	2.47	**1201**	**2409**	**2.75**	**1272**	**2655**	**3.02**
5750	985	1901	2.17	1072	2147	2.45	**1153**	**2400**	**2.73**	**1228**	**2650**	**3.02**	**1298**	**2901**	**3.31**
6000	1020	2142	2.44	1103	2391	2.72	**1183**	**2649**	**3.02**	**1256**	**2905**	**3.31**	**1324**	**3160**	**3.60**
6250	1055	2398	2.73	**1135**	**2650**	**3.02**	**1213**	**2912**	**3.32**	**1284**	**3175**	**3.62**	**1352**	**3435**	**3.91**

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	**1190**	**1526**	**1.74**	**1265**	**1746**	**1.99**	**1337**	**1972**	**2.25**	**1405**	**2199**	**2.51**	**1471**	**2431**	**2.77**
4000	**1208**	**1684**	**1.92**	**1281**	**1908**	**2.17**	**1351**	**2136**	**2.43**	**1418**	**2368**	**2.70**	**1483**	**2603**	**2.97**
4250	**1227**	**1853**	**2.11**	**1299**	**2082**	**2.37**	**1367**	**2313**	**2.64**	**1433**	**2548**	**2.90**	**1496**	**2787**	**3.18**
4500	**1247**	**2036**	**2.32**	**1317**	**2268**	**2.58**	**1384**	**2503**	**2.85**	**1448**	**2742**	**3.12**	**1510**	**2983**	**3.40**
4750	**1269**	**2232**	**2.54**	**1337**	**2468**	**2.81**	**1403**	**2707**	**3.08**	**1465**	**2948**	**3.36**	**1526**	**3194**	**3.64**
5000	**1291**	**2441**	**2.78**	**1358**	**2680**	**3.05**	**1422**	**2923**	**3.33**	**1484**	**3168**	**3.61**	**1544**	**3418**	**3.89**
5250	**1315**	**2664**	**3.03**	**1380**	**2907**	**3.31**	**1443**	**3154**	**3.59**	**1503**	**3403**	**3.88**	**1562**	**3655**	**4.16**
5500	**1339**	**2900**	**3.30**	**1403**	**3148**	**3.59**	**1464**	**3398**	**3.87**	**1524**	**3651**	**4.16**	—	—	—
5750	**1364**	**3151**	**3.59**	**1426**	**3403**	**3.88**	**1486**	**3657**	**4.17**	1545	3914	4.46	—	—	—
6000	**1389**	**3416**	**3.89**	**1450**	**3672**	**4.18**	1510	3930	4.48	—	—	—	—	—	—
6250	**1415**	**3695**	**4.21**	1476	3957	4.51	1534	4219	4.81	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. ▭ indicates field-supplied motor and drive required.
3. Factory-shipped motor drive range is 862 to 1132 rpm. Other rpms may require a field-supplied drive.
4. Maximum continuous bhp is 4.25 maximum continuous watts are 3775. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
6. Interpolation is permissible. Do not extrapolate.
7. Fan performance is based on wet coils, clean filters, and casing losses. See Table 13 for accessory/FIOP static pressure information.
8. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 11B — Fan Performance Data, 50HJQ014; 575 V Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	**724**	**481**	**0.55**	**838**	**685**	**0.78**	**937**	**889**	**1.01**	**1028**	**1097**	**1.25**	**1111**	**1309**	**1.49**
4000	**754**	**613**	**0.70**	**865**	**824**	**0.94**	**962**	**1034**	**1.18**	**1050**	**1247**	**1.42**	**1131**	**1463**	**1.67**
4250	**786**	**757**	**0.86**	**893**	**975**	**1.11**	**987**	**1191**	**1.36**	**1073**	**1408**	**1.60**	**1152**	**1629**	**1.86**
4500	**818**	**914**	**1.04**	**922**	**1138**	**1.30**	**1013**	**1360**	**1.55**	**1097**	**1583**	**1.80**	**1174**	**1808**	**2.06**
4750	**850**	**1084**	**1.23**	**951**	**1313**	**1.50**	**1040**	**1541**	**1.76**	**1122**	**1770**	**2.02**	**1197**	**2000**	**2.28**
5000	**883**	**1267**	**1.44**	**980**	**1501**	**1.71**	**1068**	**1736**	**1.98**	**1147**	**1969**	**2.24**	1221	2204	2.51
5250	**917**	**1464**	**1.67**	**1011**	**1703**	**1.94**	**1096**	**1943**	**2.21**	**1174**	**2183**	**2.49**	1246	2423	2.76
5500	**950**	**1675**	**1.91**	**1041**	**1918**	**2.19**	**1124**	**2165**	**2.47**	1201	2409	2.75	1272	2655	3.02
5750	**985**	**1901**	**2.17**	**1072**	**2147**	**2.45**	**1153**	**2400**	**2.73**	1228	2650	3.02	1298	2901	3.31
6000	**1020**	**2142**	**2.44**	**1103**	**2391**	**2.72**	**1183**	**2649**	**3.02**	1256	2905	3.31	1324	3160	3.60
6250	**1055**	**2398**	**2.73**	**1135**	**2650**	**3.02**	1213	2912	3.32	1284	3175	3.62	1352	3435	3.91

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	**1190**	**1526**	**1.74**	1265	1746	1.99	1337	1972	2.25	1405	2199	2.51	**1471**	**2431**	**2.77**
4000	1208	1684	1.92	1281	1908	2.17	1351	2136	2.43	1418	2368	2.70	**1483**	**2603**	**2.97**
4250	1227	1853	2.11	1299	2082	2.37	1367	2313	2.64	1433	2548	2.90	**1496**	**2787**	**3.18**
4500	1247	2036	2.32	1317	2268	2.58	1384	2503	2.85	1448	2742	3.12	**1510**	**2983**	**3.40**
4750	1269	2232	2.54	1337	2468	2.81	1403	2707	3.08	**1465**	**2948**	**3.36**	1526	3194	3.64
5000	1291	2441	2.78	1358	2680	3.05	1422	2923	3.33	1484	3168	3.61	1544	3418	3.89
5250	1315	2664	3.03	1380	2907	3.31	1443	3154	3.59	1503	3403	3.88	1562	3655	4.16
5500	1339	2900	3.30	1403	3148	3.59	1464	3398	3.87	1524	3651	4.16	—	—	—
5750	1364	3151	3.59	1426	3403	3.88	1486	3657	4.17	1545	3914	4.46	—	—	—
6000	1389	3416	3.89	1450	3672	4.18	1510	3930	4.48	—	—	—	—	—	—
6250	1415	3695	4.21	1476	3957	4.51	1534	4219	4.81	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. ▭ indicates field-supplied motor and drive required.
3. Factory-shipped motor drive range is 1201 to 1462 rpm. Other rpms may require a field-supplied drive.
4. Maximum continuous bhp is 3.45 maximum continuous watts are 3065. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
6. Interpolation is permissible. Do not extrapolate.
7. Fan performance is based on wet coils, clean filters, and casing losses. See Table 13 for accessory/FIOP static pressure information.
8. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 12 — Fan Performance Data, 50HJQ016 Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	**584**	**717**	**0.8**	**695**	**952**	**1.1**	**798**	**1205**	**1.3**	893	1483	1.7	984	1786	2.0
4800	**609**	**839**	**0.9**	**717**	**1085**	**1.2**	815	1346	1.5	907	1630	1.8	994	1938	2.2
5100	**634**	**971**	**1.1**	**738**	**1229**	**1.4**	833	1500	1.7	921	1791	2.0	1006	2104	2.4
5400	**660**	**1118**	**1.3**	**760**	**1389**	**1.6**	852	1669	1.9	937	1968	2.2	**1019**	**2286**	**2.6**
5700	**687**	**1284**	**1.4**	**783**	**1566**	**1.8**	873	1858	2.1	956	2165	2.4	**1034**	**2490**	**2.8**
6000	**712**	**1458**	**1.6**	805	1752	2.0	892	2055	2.3	973	2371	2.7	**1049**	**2703**	**3.0**
6300	**736**	**1644**	**1.8**	826	1952	2.2	911	2265	2.5	990	2591	2.9	**1064**	**2930**	**3.3**
6600	**763**	**1856**	**2.1**	851	2176	2.4	933	2502	2.8	1010	2837	3.2	**1082**	**3186**	**3.6**
6900	**788**	**2078**	**2.3**	873	2410	2.7	954	2747	3.1	**1029**	**3093**	**3.5**	**1099**	**3451**	**3.9**
7200	813	2316	2.6	896	2662	3.0	975	3011	3.4	**1048**	**3367**	**3.8**	**1117**	**3734**	**4.2**
7500	841	2584	2.9	921	2943	3.3	998	3304	3.7	**1070**	**3672**	**4.1**	**1137**	**4049**	**4.5**

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	**1070**	**2113**	**2.4**	**1151**	**2458**	**2.8**	**1229**	**2819**	**3.2**	**1302**	**3194**	**3.6**	**1371**	**3578**	**4.0**
4800	**1078**	**2269**	**2.5**	**1157**	**2620**	**2.9**	**1233**	**2990**	**3.3**	**1306**	**3374**	**3.8**	**1375**	**3769**	**4.2**
5100	**1086**	**2439**	**2.7**	**1164**	**2795**	**3.1**	**1238**	**3170**	**3.5**	**1310**	**3560**	**4.0**	**1378**	**3965**	**4.4**
5400	**1097**	**2626**	**2.9**	**1172**	**2986**	**3.3**	**1245**	**3366**	**3.8**	**1315**	**3763**	**4.2**	**1382**	**4174**	**4.7**
5700	**1110**	**2835**	**3.2**	**1183**	**3200**	**3.6**	**1253**	**3584**	**4.0**	**1322**	**3986**	**4.5**	**1388**	**4404**	**4.9**
6000	**1122**	**3053**	**3.4**	**1193**	**3422**	**3.8**	**1262**	**3810**	**4.3**	**1329**	**4216**	**4.7**	**1393**	**4638**	**5.2**
6300	**1135**	**3286**	**3.7**	**1204**	**3660**	**4.1**	**1271**	**4052**	**4.5**	**1336**	**4461**	**5.0**	**1399**	**4887**	**5.5**
6600	**1151**	**3549**	**4.0**	**1218**	**3928**	**4.4**	**1283**	**4325**	**4.8**	**1347**	**4739**	**5.3**	**1409**	**5169**	**5.8**
6900	**1167**	**3821**	**4.3**	**1232**	**4207**	**4.7**	**1295**	**4608**	**5.2**	**1357**	**5026**	**5.6**	1417	5460	6.1
7200	**1183**	**4113**	**4.6**	**1246**	**4505**	**5.0**	**1308**	**4912**	**5.5**	1368	5335	6.0	1437	5773	6.5
7500	**1202**	**4437**	**5.0**	**1264**	**4837**	**5.4**	1324	5251	5.9	1383	5679	6.4	1440	6122	6.9

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

NOTES:
1. **Boldface** indicates field-supplied drive required.
2. ▭ indicates field-supplied motor and drive required.
3. Factory-shipped motor drive range is 799 to 1010 rpm. Other rpms may require a field-supplied drive.
4. Maximum continuous bhp is 5.90 maximum continuous watts are 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
5. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
6. Interpolation is permissible. Do not extrapolate.
7. Fan performance is based on wet coils, clean filters, and casing losses. See Table 13 for accessory/FIOP static pressure information.
8. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 13 — Accessory/FIOP Static Pressure (in. wg)

ACCESSORY/FIOP	UNIT SIZE	UNIT VOLTAGE	kW	AIRFLOW (Cfm)								
				3750	4000	4500	5000	5600	6000	6250	7200	7500
Electric Heaters	014	208/230-3-60	14,19, 26, 34 42,56	0.05 0.06	0.05 0.06	0.06 0.07	0.07 0.08	0.08 0.10	0.09 0.12	0.09 0.13	†	†
		460-3-60	15,32 55	0.05 0.06	0.05 0.06	0.06 0.07	0.07 0.08	0.08 0.10	0.09 0.12	0.09 0.13	†	†
		575-3-60	37	0.06	0.06	0.07	0.08	0.10	0.12	0.13	†	†
	016	208/230-3-60	26,34 42,56	*	*	*	*	0.08 0.10	0.09 0.12	0.09 0.13	0.11 0.16	0.12 0.17
		460-3-60	32 55	*	*	*	*	0.08 0.10	0.09 0.12	0.09 0.13	0.11 0.15	0.12 0.17
		575-3-60	50	*	*	*	*	0.13	0.15	0.16	0.20	0.21
Economizer	All	All	—	0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.09	0.10
Glycol Coil	All	All	—	0.16	0.18	0.22	0.26	0.31	0.35	0.37	0.44	0.46

LEGEND

FIOP — Factory-Installed Option

*Do not operate unit with electric heat at this cfm. Operation at this cfm is below electric heat required minimum cfm.
†Do not operate unit at this cfm. Operation at this cfm is above unit maximum cfm limit.

NOTES:
1. Heaters are rated at 208 v, 240 v, 480 v, and 600 v.
2. The factory assembled horizontal adapter substantially improves fan performance. See Fig. 40.
3. The static pressure must be added to external static pressure. The sum and the indoor-air section entering-air cfm should then be used in conjunction with the Fan Performance table to determine blower rpm, bhp, and watts.

Table 14 — Fan Rpm at Motor Pulley Settings* (Factory-Supplied Drives)

UNIT 50HJQ	MOTOR PULLEY TURNS OPEN												
	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
014 (208/230, 460 v)	†	†	1132	1105	1078	1051	1024	997	970	943	916	889	862
014 (575 v)	1462	1436	1410	1384	1358	1332	1305	1279	1253	1227	1201	—	—
016	†	†	1010	989	968	947	926	905	883	862	841	820	799

*Approximate fan rpm shown.
†Due to belt and pulley size, pulley cannot be set to this number of turns open.

Table 15 — Indoor-Fan Motor Performance

UNIT 50HJQ	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW	MOTOR EFFICIENCY
014	208/230	4.25	3775	10.5	85.8
	460			4.9	85.8
	575	3.45	3065	3.9	81.7
016	208/230	5.90	5180	15.8	87.5
	460			7.9	87.5
	575			6.0	87.5

LEGEND

Bhp — Brake Horsepower

*Extensive motor and electrical testing on these units ensures that the full horsepower range of the motors can be utilized with confidence. Using your fan motors up to the horsepower ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 16 — Glycol Coil Data*

EDB	EGT	AIRFLOW (Cfm)																	
		4400						5000						6200					
		% Glycol																	
		25			50			25			50			25			50		
		Cap.	Gpm	Ldb	Cap.	Gpm	Ldb	Cap.	Gpm	Ldb	Cap.	Gpm	Ldb	Cap.	Gpm	Ldb	Cap.	Gpm	Ldb
55	200	310	33	120	293	33	116	333	35	117	315	36	113	375	40	111	353	40	108
	180	255	27	108	237	27	105	274	29	106	254	29	102	308	33	101	285	33	98
	160	200	21	97	181	21	93	215	23	95	194	22	91	241	25	91	217	25	87
70	200	274	29	127	257	29	124	294	31	124	276	31	121	331	35	119	310	35	116
	180	218	23	116	201	23	112	235	25	114	216	25	110	264	28	109	241	28	106
	160	164	17	104	146	17	100	176	19	103	156	18	99	197	21	99	174	20	96
80	200	249	26	132	233	27	129	268	28	130	250	28	126	301	32	125	280	32	122
	180	194	21	121	177	20	117	209	22	119	190	22	115	234	25	115	212	24	112
	160	140	15	109	123	14	106	150	16	108	131	15	104	168	18	105	146	17	102

LEGEND

Cap. — Btuh x 1000
EDB — Entering Dry-Bulb Temperature (F)
EGT — Entering Glycol Temperature (F)
Gpm — Gallons per Minute
Ldb — Leaving Dry-Bulb Temperature (F)

*This accessory glycol coil is intended for use with a MINIMUM of 25% glycol solution. It IS NOT intended for use solely with water due to freeze-up conditions and the resulting water damage to the conditioned space.

NOTE: Fluid Δt = 20 F.

Table 17 — Glycol Coil Ratings

ENTERING FLUID TEMP (F)	CFM							
	4000		5000		6000		8000	
	GPM	ΔP	GPM	ΔP	GPM	ΔP	GPM	ΔP
200	27	1.2	31	1.5	35	1.8	41	2.4
180	22	0.9	25	1.1	27	1.3	32	1.6
160	16	0.6	19	0.7	20	0.8	24	1.0

NOTE: ΔP is the fluid pressure in ft of head.

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor-fan contactor (IFC), reversing valve solenoids (RVS1 and RVS2) and compressor contactor are energized and indoor-fan motor, compressor, and outdoor fan starts. The outdoor fan motor runs continuously while unit is cooling.

HEATING, UNITS WITHOUT ECONOMIZER — Upon a request for heating from the space thermostat, terminal W1 will be energized with 24 v. The IFC, outdoor-fan contactor (OFC), C1, and C2 will be energized. The indoor fan, outdoor fans, and compressor no. 1, and compressor no. 2 are energized and RVS1 and RVS2 are deenergized and switch position.

If the space temperature continues to fall while W1 is energized, W2 will be energized with 24 v, and the heater contactor(s) (HC) will be energized, which will energize the electric heater(s).

When the space thermostat is satisfied, W2 will be deenergized first, and the electric heater(s) will be deenergized.

Upon a further rise in space temperature, W1 will be deenergized.

COOLING, UNITS WITH ECONOMI$ER IV — When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV control to provide a 50 to 55 F supply-air temperature into the zone. As the supply-air temperature fluctuates above 55 or below 50 F, the dampers will be modulated (open or close) to bring the supply-air temperature back within set point limits.

For EconoMi$er IV operation, there must be a thermostat call for the fan (G). This will move the damper to its minimum position during the occupied mode.

Above 50 F supply-air temperature, the dampers will modulate from 100% open to the minimum open position. From 50 F to 45 F supply-air temperature, the dampers will maintain at the minimum open position. Below 45 F the dampers will be completely shut. As the supply-air temperature rises, the dampers will come back open to the minimum open position once the supply-air temperature rises to 48 F.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fan will be energized and deenergized.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. Damper position will follow the higher demand condition from DCV mode or free cooling mode.

Damper movement from full closed to full open (or vice versa) will take between $1^1/_2$ and $2^1/_2$ minutes.

If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), a call for cooling (Y1 closes at the thermostat) will cause the control to modulate the dampers open to maintain the supply air temperature set point at 50 to 55 F.

As the supply-air temperature drops below the set point range of 50 to 55 F, the control will modulate the outdoor-air dampers closed to maintain the proper supply-air temperature.

HEATING, UNITS WITH ECONOMI$ER IV — When the room thermostat calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. When the indoor fan is energized, the economizer damper moves to the minimum position. When the indoor fan is off, the economizer damper is fully closed.

COOLING, UNITS WITH ECONOMI$ER2, PREMIERLINK™ CONTROL AND A THERMOSTAT — When free cooling is not available, the compressors will be controlled by the PremierLink control in response to the Y1 and Y2 inputs from the thermostat.

The PremierLink control will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75 F.
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if an enthalpy sensor not available).
- Economizer position is NOT forced.

Pre-cooling occurs when the is no call from the thermostat except G. Pre-cooling is defined as the economizer modulates to provide 70 F supply air.

When free cooling is available the PremierLink control will control the compressors, energize the reversing valve(s) and economizer to provide a supply-air temperature determined to meet the Y1 and Y2 calls from the thermostat using the following three routines. The three control routines are based on OAT.

The 3 routines are based on OAT where:

SASP = Supply Air Set Point

DXCTLO = Direct Expansion Cooling Lockout Set Point

PID = Proportional Integral

Routine 1 (OAT < DXCTLO)

- Y1 energized – economizer maintains a SASP = (SATLO1 + 3).
- Y2 energized – economizer maintains a SASP = (SATLO2 + 3).

Routine 2 (DXCTLO < OAT < 68 F)

- If only Y1 energized, the economizer maintains a SASP = (SATLO1 + 3).
- If SAT > SASP + 5 and economizer position > 80%, economizer will go to minimum position for 3 minutes or until SAT > 68 F.
- First stage of mechanical cooling will be energized.
- Integrator resets.
- Economizer opens again and controls to current SASP after stage one on for 90 seconds.
- With Y1 and Y2 energized economizer maintains an SASP = SATLO2 + 3.
- If SAT > SASP + 5 and economizer position >80%, economizer will go to minimum position for 3 minutes or until SAT > 68 F.
- If compressor one is on then second stage of mechanical cooling will be energized. Otherwise the first stage will be energized.
- Integrator resets.
- Economizer opens again and controls to SASP after stage one on for 90 seconds.

Routine 3 (OAT > 68)

- Economizer is opened 100%.
- Compressors 1 and 2 are cycled based on Y1 and Y2 using minimum on and off times and watching the supply air temperature as compared to SATLO1 and SATLO2 set points.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

If field-installed accessory CO_2 sensors are connected to the PremierLink™ control, a PID-controlled demand ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

HEATING, UNITS WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A THERMOSTAT — When the thermostat calls for heating, terminal W1 is energized. The PremierLink control will move the economizer damper to the minimum position if there is a call for G and closed if there is a call for W1 without G. In order to prevent thermostat from short cycling, the unit is locked into the heating mode for at least 10 minutes when W1 is energized. The reversing valve solenoid(s) deenergizes and switches position (RVS1 and RVS2).

On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the electric heat (if used) comes on. When the thermostat is satisfied and W1 is deenergized, the IFM stops.

COOLING, UNITS WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A ROOM SENSOR — When free cooling is not available, the compressors will be controlled by the PremierLink controller using a PID Error reduction calculation as indicated by Fig 41.

The PremierLink controller will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75 F.
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if and enthalpy sensor is not available).
- Economizer position is NOT forced.

When free cooling is available, the outdoor-air damper is positioned through the use of a Proportional Integral (PID) control process to provide a calculated supply-air temperature into the zone. The supply air will maintain the space temperature between the heating and cooling set points as indicated in Fig. 42.

The PremierLink control will integrate the compressors stages with the economizer based on similar logic as the three routines listed in the previous section. The SASP will float up and down based on the error reduction calculations that compare space temperature and space set point. The reversing valves will be energized.

When outdoor-air temperature conditions require the economizer to close for a compressor stage-up sequence, the economizer control integrator is reset to zero after the stage-up sequence is completed. This prevents the supply-air temperature from dropping too quickly and creating a freeze condition that would make the compressor turn off prematurely.

The high space set point is used for DX (direct expansion) cooling control, while the economizer space set point is a calculated value between the heating and cooling set points. The economizer set point will always be at least one degree below the cooling set point, allowing for a smooth transition from mechanical cooling with economizer assist, back to economizer cooling as the cooling set point is achieved. The compressors may be used for initial cooling then the PremierLink controller will modulate the economizer using an error reduction calculation to hold the space temperature between the heating and cooling set points. See Fig. 42.

The controller uses the following conditions to determine economizer cooling:

- Enthalpy is Low
- SAT reading is available
- OAT reading is available
- SPT reading is available
- OAT ≤ SPT
- Economizer Position is NOT forced

If any of the above conditions are **not** met, the economizer submaster reference (ECSR) is set to maximum limit and the damper moves to minimum position. The operating sequence is complete. The ECSR is recalculated every 30 seconds.

If an optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

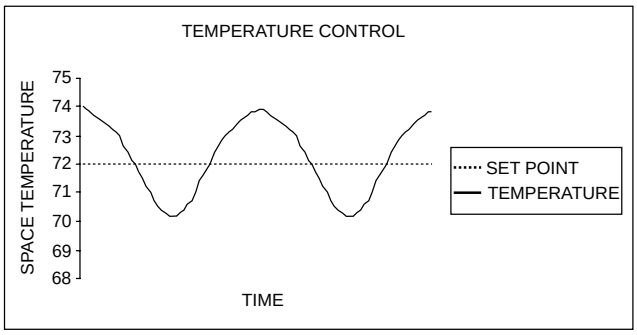
If field-installed accessory CO_2 sensors are connected to the PremierLink control, a PID-controlled demand ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

HEATING, UNITS WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A ROOM SENSOR — Every 40 seconds the controller will calculate the required heat stages (maximum of 3) to maintain supply-air temperature (SAT) if the following qualifying conditions are met:

- Indoor fan has been on for at least 30 seconds.
- COOL mode is not active.
- OCCUPIED, TEMP.COMPENSATED START or HEAT mode is active.
- SAT reading is available.
- Fire shutdown mode is not active.

If all of the above conditions are met, the number of heat stages is calculated; otherwise the required number of heat stages will be set to 0.

If the PremierLink controller determines that heat stages are required, the economizer damper will be moved to minimum position if occupied and closed if unoccupied.



OTE: PremierLink control performs smart staging of 2 stages of DX ooling and up to 3 stages of heat.

Fig. 41 — DX Cooling Temperature Control Example

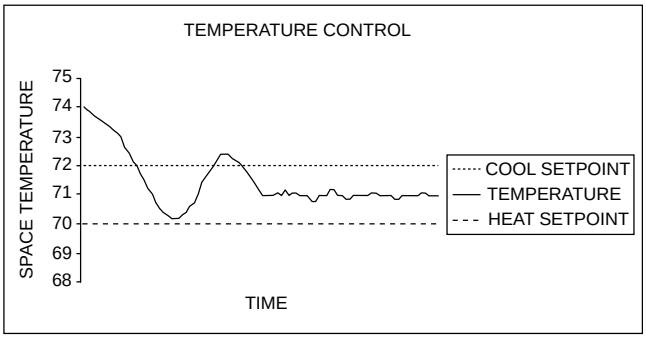


Fig. 42 — Economizer Temperature Control Example

Staging should be as follows:

If Heating PID STAGES=2

- HEAT STAGES=1 (75% capacity) will energize HS1
- HEAT STAGES=2 (100% capacity) will energize HS2

In order to prevent short cycling, the unit is locked into the Heating mode for at least 10 minutes when HS1 is deenergized. On units equipped for two stages of heat, when additional heat is needed, it may be provided by electric heat (if supplied). When the space condition is satisfied and HS1 is deenergized the IFM stops. The fan will run continuously in the occupied mode as required by national energy and fresh air standards.

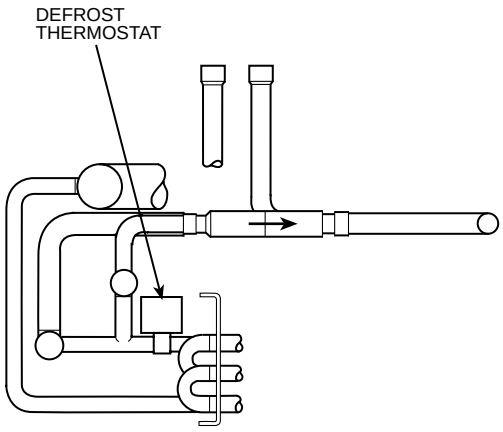
DEFROST — When the temperature of the outdoor coil drops below 28 F as sensed by the defrost thermostat (DFT2) and the defrost timer is at the end of a timed period (adjustable at 30, 50, or 90 minutes), reversing valve solenoids (RVS1 and RVS2) are energized and the OFC is deenergized. This switches the position of the reversing valves and shuts off the outdoor fan. The electric heaters (if installed) will be energized.

The unit continues to defrost until the coil temperature as measured by DFT2 (see Fig. 43) reaches 65 F, or the duration of defrost cycle completes a 10-minute period.

During the Defrost mode, if circuit 1 defrosts first, RVS1 will oscillate between Heating and Cooling modes until the Defrost mode is complete.

At the end of the defrost cycle, the electric heaters (if installed) will be deenergized; the reversing valves switch and the outdoor-fan motor will be energized. The unit will now operate in the Heating mode.

If the space thermostat is satisfied during a defrost cycle, the unit will continue in the Defrost mode until the time or temperature constraints are satisfied.



NOTE: Defrost thermostat is located at the bottom tee of circuit no. 1 and the top tee of circuit no. 2.

Fig. 43 — Defrost Thermostat Location

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury.

Cleaning — Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

INDOOR COIL — Clean as required with a commercial coil cleaner.

OUTDOOR COIL — Clean outdoor coil annually and as required by location and outdoor-air conditions. Inspect coil monthly — clean as required.

CONDENSATE DRAIN — Check and clean each year at start of cooling season.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 for type and size.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. Observe the level in the sight glass immediately after shutdown while the oil is still warm. If the oil level is observed when the oil is cold, the level observed may be a mixture of oil and refrigerant which is not a true indication of the oil level. If oil level observed is not between the low limit and high limit levels as indicated in Fig. 44, add oil until it is in the correct range.

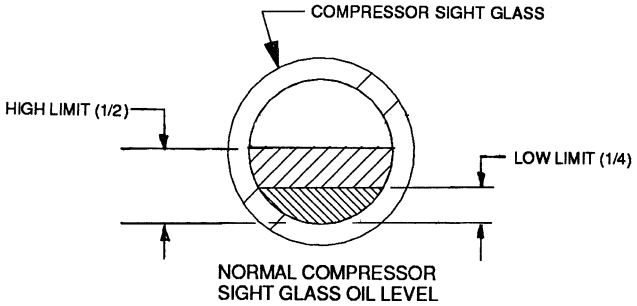


Fig. 44 — Compressor Sight Glass Oil Level

FAN SHAFT BEARINGS — For size 014 units, bearings are permanently lubricated. No field lubrication is required. For size 016 units, the bearings are of the pillow block type and have grease fittings. The bearing opposite the motor end has an extended tube line so it can be lubricated from the motor side. Lubricate the bearings twice annually.

Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

OUTDOOR AND INDOOR-FAN MOTOR BEARINGS — The outdoor and indoor-fan motors have permanently sealed bearings, so no field lubrication is necessary.

Indoor Fan, 50HJQ014 Units

PERFORMANCE ADJUSTMENT — Fan motor pulleys on the 50HJQ014 units are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting plate nuts.
3. Loosen movable-pulley flange setscrew (see Fig. 45).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew.

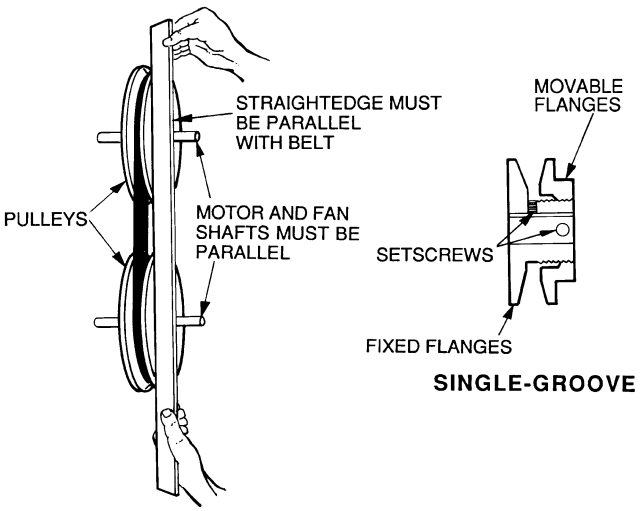


Fig. 45 — Indoor-Fan Pulley Alignment and Adjustment

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

SERVICE AND REPLACEMENT (see Fig. 46)

NOTE: To remove belts only, follow Steps 1-7.

1. Remove filter and supply-air section panels.
2. Remove unit top panel.
3. Remove coil guard.
4. Loosen screws A and B on both sides of motor mount assembly.
5. Loosen screw C.
6. Rotate motor mount assembly (with motor attached) as far as possible away from indoor coil.
7. Remove belt.
8. Rotate motor mount assembly back past original position toward indoor coil.
9. Remove motor mounting nuts D and E (both sides).
10. Lift motor up through top of unit.
11. Reverse Steps 1-10 to install new motor.
12. Check and adjust belt tension as necessary.

Indoor Fan, 50HJQ016 Units

PERFORMANCE ADJUSTMENT — Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen nuts on the 2 carriage bolts in the mounting base. Install jacking bolt and plate under motor base (bolt and plate are shipped in installer's packet). Using bolt and plate, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts.
3. Loosen movable-pulley flange setscrew (See Fig. 45).

SERVICE AND REPLACEMENT (See Fig. 47) — The 50HJQ016 units use a fan motor mounting system that features a slide-out motor mounting plate. To replace or service the motor, slide out the bracket.

1. Remove the indoor-fan access panel and the heating control access panel.
2. Remove the center post (located between the indoor fan and heating control access panels) and all screws securing it.
3. Loosen nuts on the two carriage bolts in the motor mounting base.

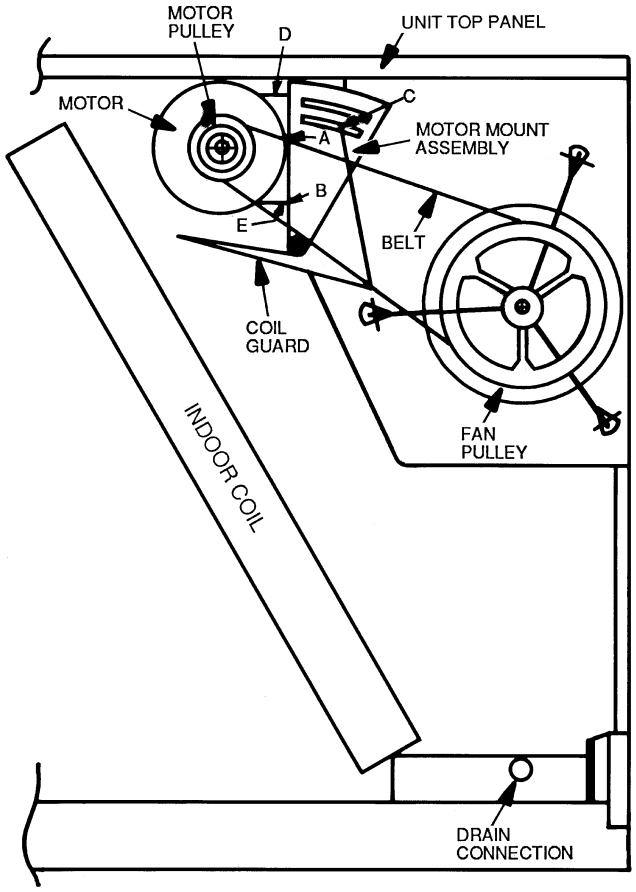
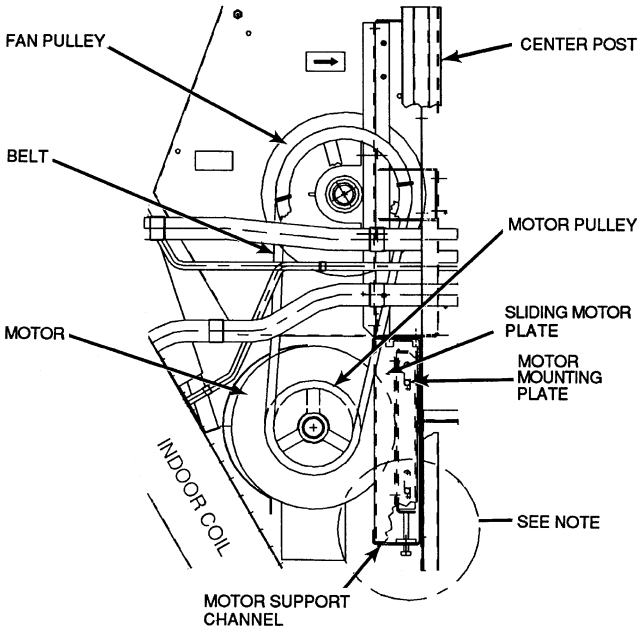


Fig. 46 — 50HJQ014 Indoor-Fan Motor Section



NOTE: A $3^1/_2$-in. bolt and threaded plate are included in the installer's packet. They can be added to the motor support channel below the motor mounting plate to aid in raising the motor.

Fig. 47 — 50HJQ016 Indoor-Fan Motor Section

4. Using jacking bolt under motor base, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts.
5. Remove the belt drive.
6. Remove jacking bolt and tapped jacking bolt plate.
7. Remove the 2 screws that secure the motor mounting plate to the motor support channel.
8. Remove the 3 screws from the end of the motor support channel that interfere with the motor slide path.
9. Slide out the motor and motor mounting plate.
10. Disconnect wiring connections and remove the 4 mounting bolts.
11. Remove the motor.
12. To install the new motor, reverse Steps 1-11.
13. Check and adjust belt tension as necessary.

Belt Tension Adjustment — To adjust belt tension:

1. Loosen fan motor bolts.
2. a. Size 014 units:

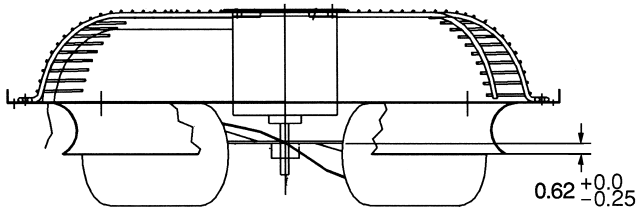
   Move motor mounting plate up or down for proper belt tension ($^1/_2$ in. deflection with one finger).

   b. Size 016 units:

   Turn motor jacking bolt to move motor mounting plate up or down for proper belt tension ($^3/_8$ in. deflection at midspan with one finger [9 lb force]).
3. Tighten nuts.
4. Adjust bolts and nut on mounting plate to secure motor in fixed position.

Outdoor-Fan Adjustment (Fig. 48)

1. Turn off unit power supply.
2. Remove access panel(s) closest to the fan to be adjusted.
3. Loosen fan hub setscrews.
4. Adjust the fan height on the shaft using a straightedge placed across the fan orifice.
5. Tighten setscrews and replace panel(s).
6. Turn on unit power.



NOTE: Dimensions are in inches.

Fig. 48 — Outdoor Fan Adjustment

Power Failure — Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate and in Table 1. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1).

LOW CHARGE COOLING — Using appropriate cooling charging chart (see Fig. 49 and 50), add refrigerant until conditions of the chart are met. Note that charging charts are different from those normally used. Charts are based on charging units to correct superheat for various operating conditions. An accurate pressure gage and temperature sensing device are required. Connect temperature sensing device to service port on suction line and insulate it so that outdoor ambient temperature does not affect reading. Indoor-air cfm must be within normal operating range of unit.

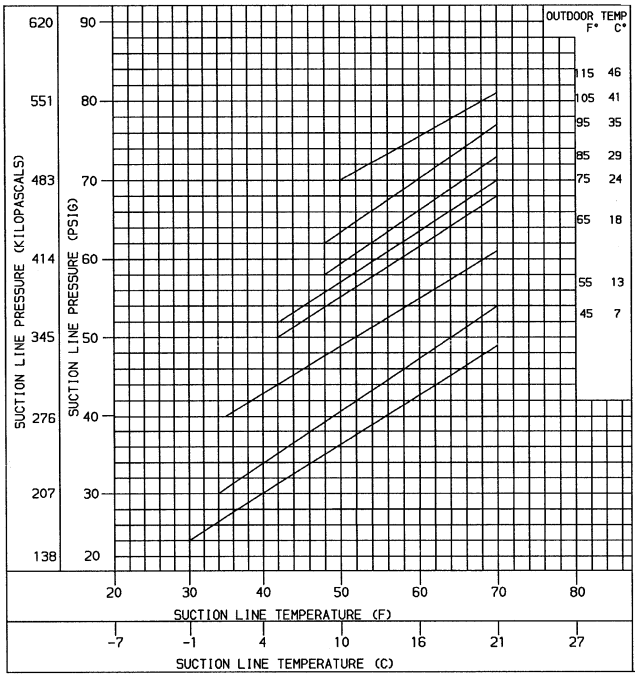


Fig. 49 — Cooling Charging Chart, 50HJQ014 Units

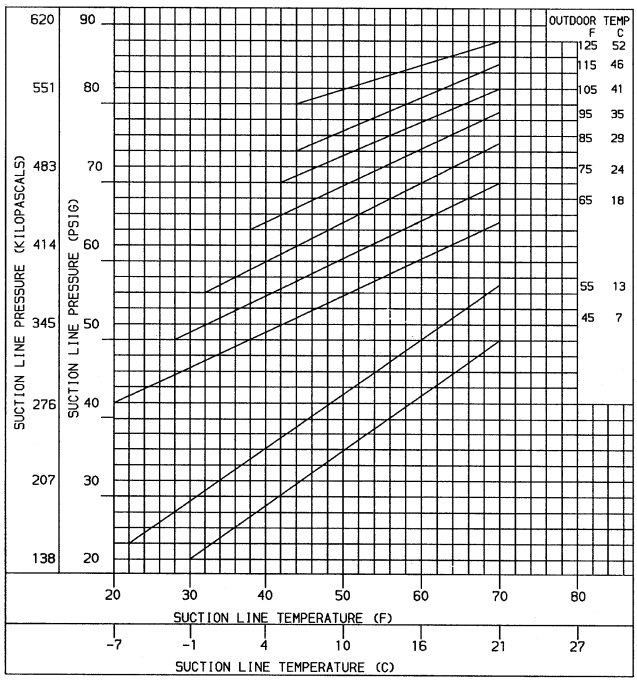


Fig. 50 — Cooling Charging Chart, 50HJQ016 Units

TO USE COOLING CHARGING CHART — Take outdoor ambient temperature and read the suction pressure gage. Refer to appropriate chart to determine correct suction temperature. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

Example (Fig. 50)

Outdoor Temperature . . . . . 85 F
Suction Pressure . . . . . 70 psig
Suction Temperature Should be . . . . . 60 F
(Suction Temperature may vary ± 5 F.)

LOW CHARGE, HEATING — If outdoor ambient temperature is above 40 F, operate unit on cooling and refer to Low Charge Cooling section above. If outdoor ambient is below 40 F, evacuate system and weigh in specified amount of refrigerant. (Refer to Table 1.)

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has one manual reset, calibrated trip, magnetic circuit breaker. Do not bypass connections or increase the size of the circuit breaker to correct trouble. Determine the cause of the trouble and correct it before resetting the breaker.

Overtemperature — Each compressor has internal protector to protect it against excessively high discharge gas temperature.

Crankcase Heaters — Each compressor has 125-watt crankcase heaters to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. Since power for the crankcase heaters is drawn from the unit incoming power, main unit power must be on for the heaters to be energized.

> IMPORTANT: After a prolonged shutdown or service job, energize the crankcase heaters for 24 hours before starting the compressors.

Compressor Lockout — If any of the safeties (high-pressure or low-pressure, freeze protection thermostat, compressor internal thermostat) trip, or if there is loss of power to the compressors, the CLO (compressor lockout) will lock the compressors off. To reset, manually move the thermostat setting.

INDOOR-FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

OUTDOOR-FAN MOTOR PROTECTION — Each outdoor-fan motor is internally protected against overtemperature.

HIGH-PRESSURE AND LOW-PRESSURE SWITCHES — If either switch trips, or if the compressor overtemperature switch activates, that refrigerant circuit will be automatically locked out by the CLO. To reset, manually move the thermostat setting.

FREEZE PROTECTION THERMOSTAT (FPT) — An FPT is located on the indoor coil. It detects frost build-up and turns off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized by resetting the CLO from the thermostat.

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side.

Control Circuit, 24-V — This control circuit is protected against overcurrent by a 3.2-amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting. Typical wiring is shown in Fig. 51. Typical component arrangement is shown in Fig. 52.

Diagnostic LEDs — The unit control boards have LEDs for diagnostic purpose. Refer to Troubleshooting section on page 38.

Optional Hinged Access Doors — When the optional service package is ordered or if the hinged access doors option is ordered, the unit will be provided with external and internal hinged access doors to facilitate service.

Four external hinged access doors are provided. All external doors are provided with 2 large $^1/_4$ turn latches with folding bail-type handles. (Compressor access doors have one latch.) A single door is provided for filter and drive access. One door is provided for control box access. The control box access door is interlocked with the non-fused disconnect which must be in the OFF position to open the door. Two doors are provided for access to the compressor compartment.

Two internal access doors are provided inside the filter/drive access door. The filter access door (on the left) is secured by 2 small $^1/_4$ turn latches with folding bail-type handles. This door must be opened prior to opening the drive access door. The drive access door is shipped with 2 sheet metal screws holding the door closed. Upon initial opening of the door, these screws may be removed and discarded. The door is then held shut by the filter access door, which closes over it.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

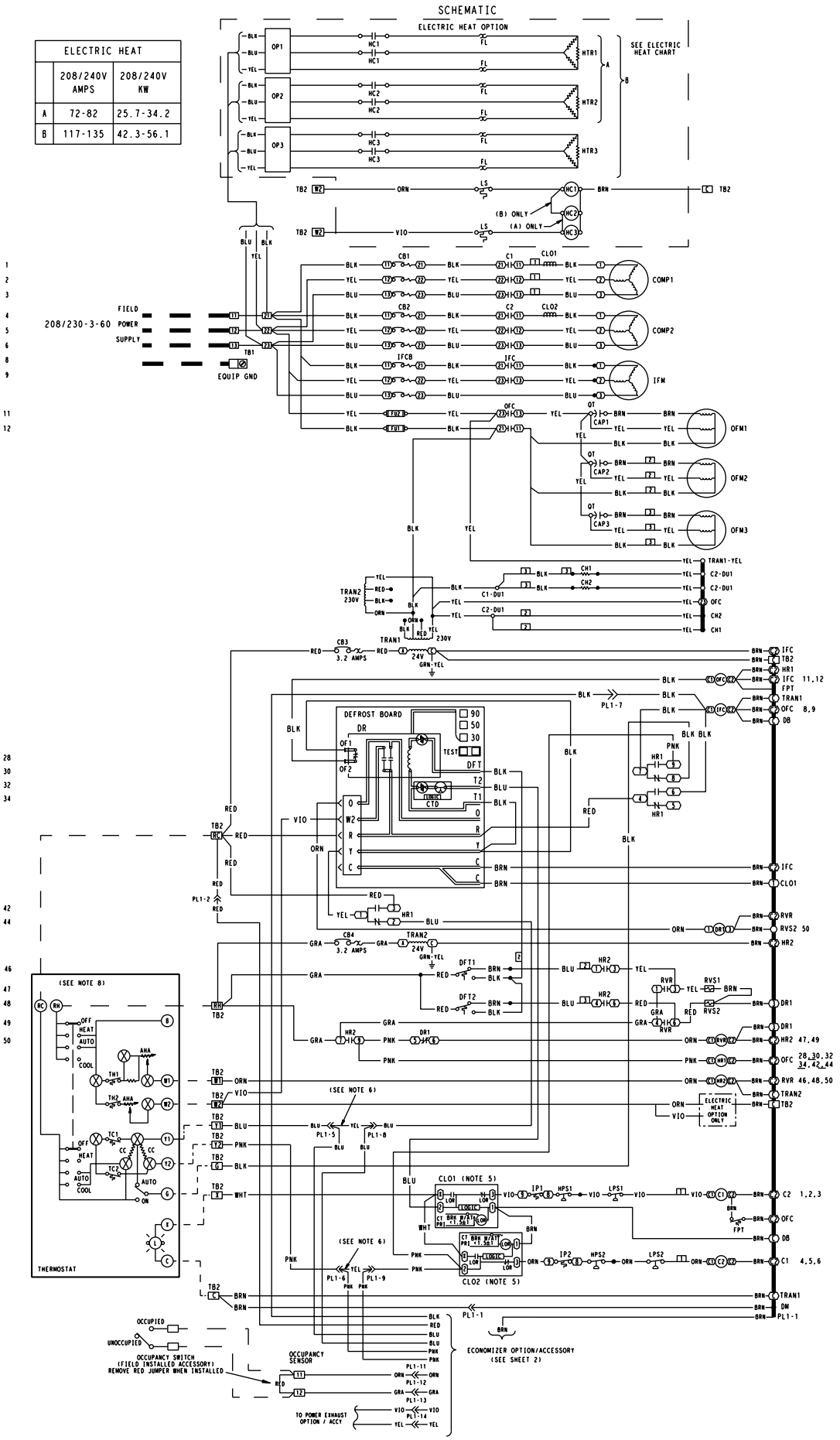


Fig. 51 — Typical Wiring Diagram (50HJQ016, 208/230-3-60 V Shown)

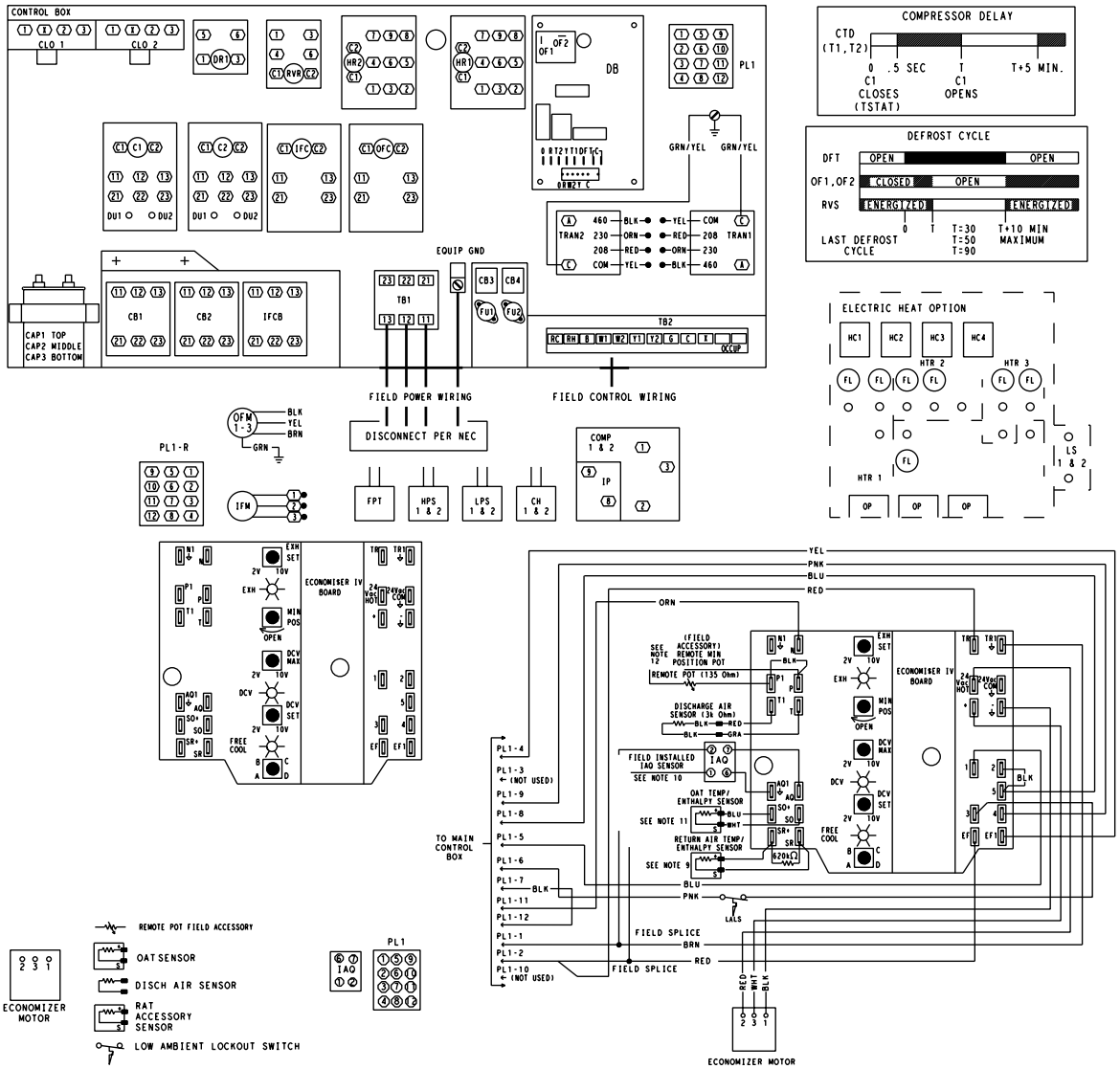


Fig. 52 — Typical Component Arrangement (50HJQ016, 208/230-3-60 V Shown)

LEGEND AND NOTES FOR FIG. 51 AND 52

LEGEND

AHA — Adjustable, Heat Anticipator
BKR W/AT — Breaks With Amp Turns
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CH — Crankcase Heater
CLO — Compressor Lockout
COMP — Compressor Motor
CTD — Compressor Time Delay
DB — Defrost Board
DFT — Defrost Thermostat
DM — Damper Motor
DR — Defrost Relay
DU — Dummy Terminal
EQUIP — Equipment
FL — Fuse Link
FPT — Freeze Protection Thermostat
FU — Fuse
GND — Ground
HC — Heater Contactor
HPS — High-Pressure Switch
HR — Heat Relay
HTR — Heater
IAQ — Indoor Air Quality Sensor
IFC — Indoor Fan Contactor
IFCB — Indoor Fan Circuit Breaker
IFM — Indoor Fan Motor
IP — Internal Protector
L — Light
LALS — Low Temperature Compressor Lockout Switch
LPS — Low-Pressure Switch
LS — Limit Switch
NEC — National Electrical Code
OAT — Outdoor Air Temperature Sensor
OCCUP — Occupancy Sensor
OFC — Outdoor Fan Contactor
OFM — Outdoor Fan Motor
OP — Overload Protection
PL — Plug Assembly
QT — Quadruple Terminal
RAT — Return Air Temperature Sensor
RVR — Reversing Valve Relay
RVS — Reversing Valve Solenoid
TB — Terminal Block
TC — Thermostat Cooling
TH — Thermostat Heating
TRAN — Transformer
Terminal (Marked)
Terminal (Unmarked)
Terminal Block
Splice
Factory Wiring
Field Control Wiring
Accessory or Optional Wiring
To indicate common potential only; not to represent wiring.

NOTES:
1. Compressor and/or fan motor(s) thermally protected. Three phase motors protected against primary single phasing conditions.
2. If any of the original wire furnished must be replaced, it must be replaced with Type 90° C or its equivalent.
3. TRAN1 is wired for 230-v operation. If unit is 208-v, disconnect the BLACK wires from the ORN TRAN wire and reconnect to the RED TRAN wire. Apply wirenuts to wires.
4. CB1, 2 Must Trip Amps are equal to or less than 156% FLA, IFCB 140%.
5. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices; before replacing CLO check these devices.
6. Jumpers are omitted when unit is equipped with economizer.
7. Number(s) indicates the line location of used contacts. A bracket over (2) numbers signifies a single pole, double throw contact. An underlined number signifies a normally closed contact. Plain (no line) number signifies a normally open contact.
8. Remove jumper between RC and RH.
9. 620 Ohm, 1 watt, 5% resistor should be removed only when using differential enthalpy or dry bulb.
10. If a separate field-supplied 24 v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
11. OAT sensor is shipped inside unit and must be relocated in the field for proper operation.
12. For field installed remote minimum position POT. remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

TROUBLESHOOTING

Unit Troubleshooting — Refer to Tables 18 and 19, Fig. 53-55 for assistance when troubleshooting the 50HJQ units.

**EconoMi$erIV Troubleshooting —** See Table 19 for EconoMi$erIV logic.

A functional view of the EconoMi$erIV is shown in Fig. 56. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$erIV simulator program is available from Carrier to help with EconoMi$erIV training and troubleshooting.

ECONOMI$ERIV PREPARATION — This procedure is used to prepare the EconoMi$erIV for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE: This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the EconoMi$erIV.

IMPORTANT: Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contacts should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals S_O and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals S_O and +.
8. Put 620-ohm resistor across terminals S_R and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

DIFFERENTIAL ENTHALPY — To check differential enthalpy:

1. Make sure EconoMi$erIV preparation procedure has been performed.
2. Place 620-ohm resistor across S_O and +.
3. Place 1.2 kilo-ohm resistor across S_R and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across S_O and +. The Free Cool LED should turn off.
5. Return EconoMi$erIV settings and wiring to normal after completing troubleshooting.

SINGLE ENTHALPY — To check single enthalpy:

1. Make sure EconoMi$erIV preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi$erIV settings and wiring to normal after completing troubleshooting.

DCV (Demand Controlled Ventilation) AND POWER EXHAUST — To check DCV and Power Exhaust:

1. Make sure EconoMi$erIV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9-v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$erIV settings and wiring to normal after completing troubleshooting.

DCV MINIMUM AND MAXIMUM POSITION — To check the DCV minimum and maximum position:

1. Make sure EconoMi$erIV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$erIV settings and wiring to normal after completing troubleshooting.

SUPPLY-AIR INPUT — To check supply-air input:

1. Make sure EconoMi$erIV preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20 and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.
4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return EconoMi$erIV settings and wiring to normal after completing troubleshooting.

ECONOMI$ER IV TROUBLESHOOTING COMPLETION — This procedure is used to return the EconoMi$erIV to operation. No troubleshooting or testing is done by performing the following procedure.

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals S_R and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals S_O and +. If used, reconnect sensor from terminals S_O and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

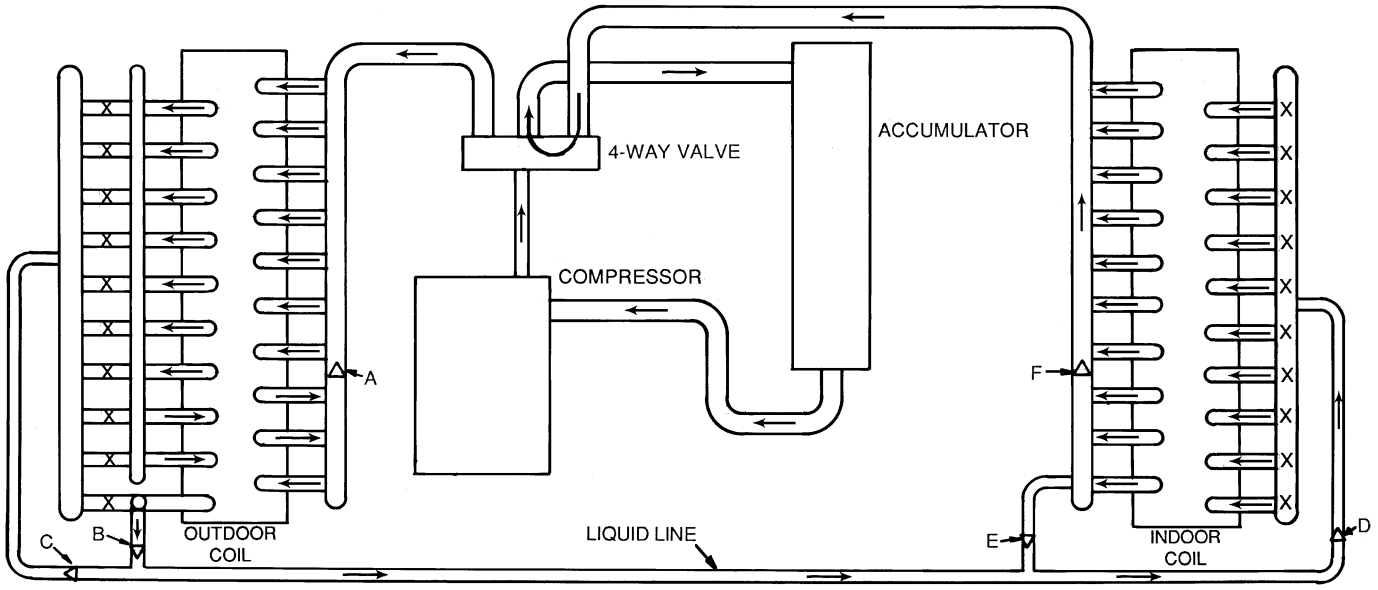
Table 18 — Check Valve Functions

CHECK VALVE IDENTIFICATION (See Fig. 53)	LOCATION	COOLING CYCLE	HEATING CYCLE	COOLING CYCLE CHECK VALVE STUCK		HEATING CYCLE CHECK VALVE STUCK	
				Open	Closed	Open	Closed
A	Outdoor coil; Header	Closed	Open	Lose circuiting in outdoor coil. Acts like low charge.	Normal	Normal	Bottom 3 circuits restricted
B	Outdoor coil; Liquid line feeding fixed orifice	Open	Closed	Normal	Lose some capacity	Restricted outdoor fixed orifice	Normal
C	Outdoor coil; Liquid line leaving coil	Closed	Open	Restricted liquid line	Normal	Normal	Flooding outdoor coil and compressor
D	Indoor coil; Liquid line feeding fixed orifice	Open	Closed	Normal	Restricted indoor fixed orifice	Lose some capacity	Normal
E	Indoor coil; Liquid line leaving coil	Closed	Open	Bypasses coil and floods compressor	Normal	Normal	Restricted liquid line
F	Indoor coil; Header	Open	Closed	Normal	Bottom circuits of indoor coil inactive	Lose indoor coil circuiting — symptom of low charge	Normal

Table 19 — EconoMi$erIV Input/Output Logic

INPUTS					OUTPUTS			
Demand Control Ventilation (DCV)	Enthalpy*		Y1	Y2	Compressor		N Terminal†	
	Outdoor	Return			Stage 1	Stage 2	Occupied	Unoccupied
							Damper	
Below set (DCV LED Off)	High (Free Cooling LED Off)	Low	On	On	On	On	Minimum position	Closed
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating** (between min. position and full-open)	Modulating** (between closed and full-open)
			On	Off	Off	Off		
			Off	Off	Off	Off	Minimum position	Closed
Above set (DCV LED On)	High (Free Cooling LED Off)	Low	On	On	On	On	Modulating†† (between min. position and DCV maximum)	Modulating†† (between closed and DCV maximum)
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating***	Modulating†††
			On	Off	Off	Off		
			Off	Off	Off	Off		

*For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.
†Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).
**Modulation is based on the supply air sensor signal.
††Modulation is based on the DCV signal.
***Modulation is based on the greater of DCV and supply air sensor signals, between minimum position and either maximum position (DCV) or fully open (supply air signal).
†††Modulation is based on the greater of DCV and supply air sensor signals, between closed and either maximum position (DCV) or fully open (supply air signal).

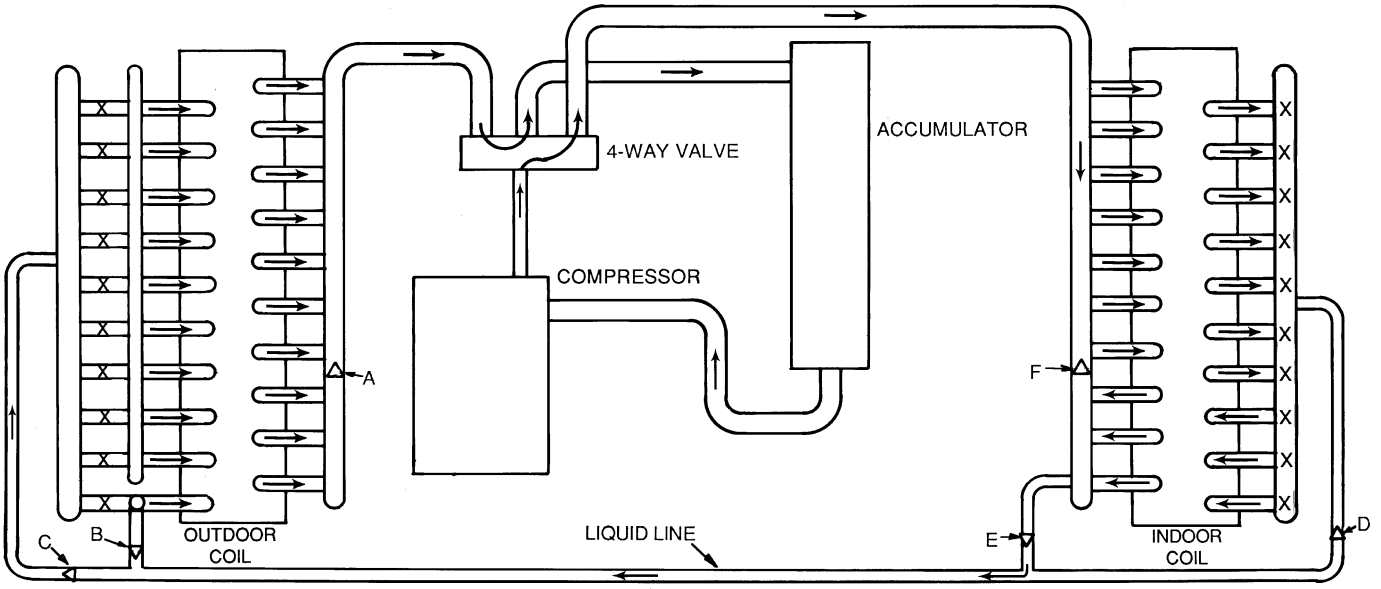


COOLING CYCLE

→ — Refrigerant Flow Direction
Δ — Check Valve Flow Direction
X — Fixed Orifice

CHECK VALVE*	COOLING	HEATING
A	Closed	Open
B	Open	Closed
C	Closed	Open
D	Open	Closed
E	Closed	Open
F	Open	Closed

NOTES:
1. Hot gas from compressor flows through the 4-way valve and is directed to the outdoor-coil header. At the header it is condensed and subcooled through converging circuits (7-2-1). Refrigerant leaves the outdoor-coil by way of the check valve to the liquid line.
2. The refrigerant then flows through the filter drier and feeds the indoor coil by way of fixed orifice tubes on each circuit.
3. Each circuit evaporates the refrigerant, and the circuits are combined in the indoor-coil header with some of the circuits flowing through the check valve.
4. The refrigerant then flows through the 4-way valve, accumulator and back to the compressor.



HEATING CYCLE

NOTES:
1. Hot gas from compressor flows through the 4-way valve and is directed to the indoor-coil header. At the header it is condensed and directed through subcooling circuits and out the indoor-coil check valve to the liquid line.
2. The refrigerant then flows through a strainer and feeds the outdoor-coil by way of fixed orifice tubes on each circuit.
3. Each circuit evaporates the refrigerant, and the circuits are combined in the outdoor-coil header with some of the circuits flowing through the check valve.
4. The refrigerant then flows through the 4-way valve, accumulator and back to the compressor.

*See Table 18 for check valve operation details.

NOTE: Circuitry shown is for single system; 50HJQ016 units have 2 individual and independent refrigeration systems that each operate in an identical manner.

Fig. 53 — Typical Heat Pump Operation

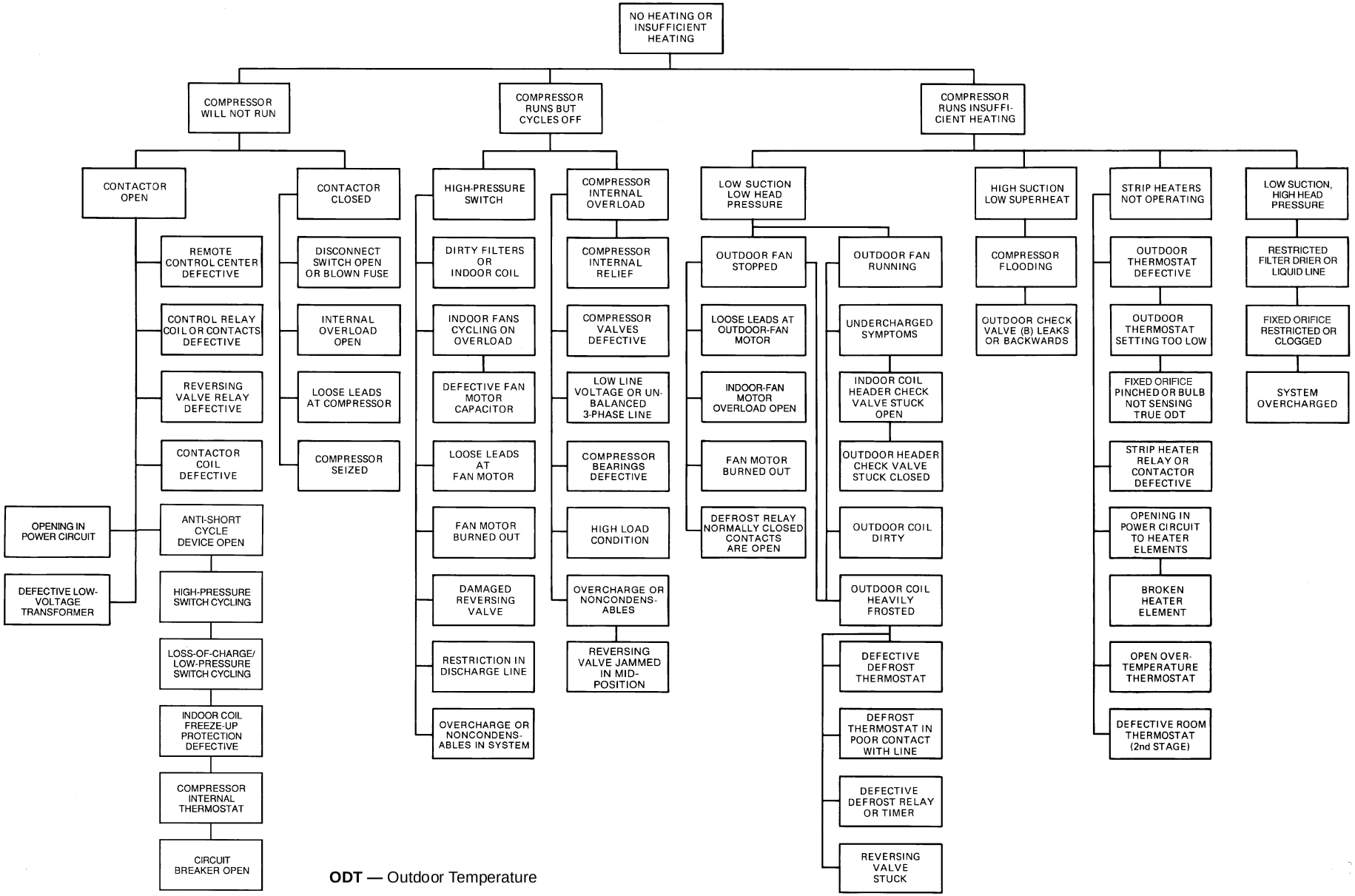

NO HEATING OR INSUFFICIENT HEATING
COMPRESSOR WILL NOT RUN
COMPRESSOR RUNS BUT CYCLES OFF
COMPRESSOR RUNS INSUFFICIENT HEATING
CONTACTOR OPEN
CONTACTOR CLOSED
HIGH-PRESSURE SWITCH
COMPRESSOR INTERNAL OVERLOAD
LOW SUCTION LOW HEAD PRESSURE
HIGH SUCTION LOW SUPERHEAT
STRIP HEATERS NOT OPERATING
LOW SUCTION, HIGH HEAD PRESSURE
REMOTE CONTROL CENTER DEFECTIVE
CONTROL RELAY COIL OR CONTACTS DEFECTIVE
REVERSING VALVE RELAY DEFECTIVE
CONTACTOR COIL DEFECTIVE
OPENING IN POWER CIRCUIT
DEFECTIVE LOW-VOLTAGE TRANSFORMER
ANTI-SHORT CYCLE DEVICE OPEN
HIGH-PRESSURE SWITCH CYCLING
LOSS-OF-CHARGE/ LOW-PRESSURE SWITCH CYCLING
INDOOR COIL FREEZE-UP PROTECTION DEFECTIVE
COMPRESSOR INTERNAL THERMOSTAT
CIRCUIT BREAKER OPEN
DISCONNECT SWITCH OPEN OR BLOWN FUSE
INTERNAL OVERLOAD OPEN
LOOSE LEADS AT COMPRESSOR
COMPRESSOR SEIZED
DIRTY FILTERS OR INDOOR COIL
INDOOR FANS CYCLING ON OVERLOAD
DEFECTIVE FAN MOTOR CAPACITOR
LOOSE LEADS AT FAN MOTOR
FAN MOTOR BURNED OUT
DAMAGED REVERSING VALVE
RESTRICTION IN DISCHARGE LINE
OVERCHARGE OR NONCONDENSABLES IN SYSTEM
COMPRESSOR INTERNAL RELIEF
COMPRESSOR VALVES DEFECTIVE
LOW LINE VOLTAGE OR UNBALANCED 3-PHASE LINE
COMPRESSOR BEARINGS DEFECTIVE
HIGH LOAD CONDITION
OVERCHARGE OR NONCONDENSABLES
REVERSING VALVE JAMMED IN MID-POSITION
OUTDOOR FAN STOPPED
LOOSE LEADS AT OUTDOOR-FAN MOTOR
INDOOR-FAN MOTOR OVERLOAD OPEN
FAN MOTOR BURNED OUT
DEFROST RELAY NORMALLY CLOSED CONTACTS ARE OPEN
OUTDOOR FAN RUNNING
UNDERCHARGED SYMPTOMS
INDOOR COIL HEADER CHECK VALVE STUCK OPEN
OUTDOOR HEADER CHECK VALVE STUCK CLOSED
OUTDOOR COIL DIRTY
OUTDOOR COIL HEAVILY FROSTED
DEFECTIVE DEFROST THERMOSTAT
DEFROST THERMOSTAT IN POOR CONTACT WITH LINE
DEFECTIVE DEFROST RELAY OR TIMER
REVERSING VALVE STUCK
COMPRESSOR FLOODING
OUTDOOR CHECK VALVE (B) LEAKS OR BACKWARDS
OUTDOOR THERMOSTAT DEFECTIVE
OUTDOOR THERMOSTAT SETTING TOO LOW
FIXED ORIFICE PINCHED OR BULB NOT SENSING TRUE ODT
STRIP HEATER RELAY OR CONTACTOR DEFECTIVE
OPENING IN POWER CIRCUIT TO HEATER ELEMENTS
BROKEN HEATER ELEMENT
OPEN OVER-TEMPERATURE THERMOSTAT
DEFECTIVE ROOM THERMOSTAT (2nd STAGE)
RESTRICTED FILTER DRIER OR LIQUID LINE
FIXED ORIFICE RESTRICTED OR CLOGGED
SYSTEM OVERCHARGED
ODT — Outdoor Temperature

Fig. 54 — Troubleshooting Chart, Heating Cycle

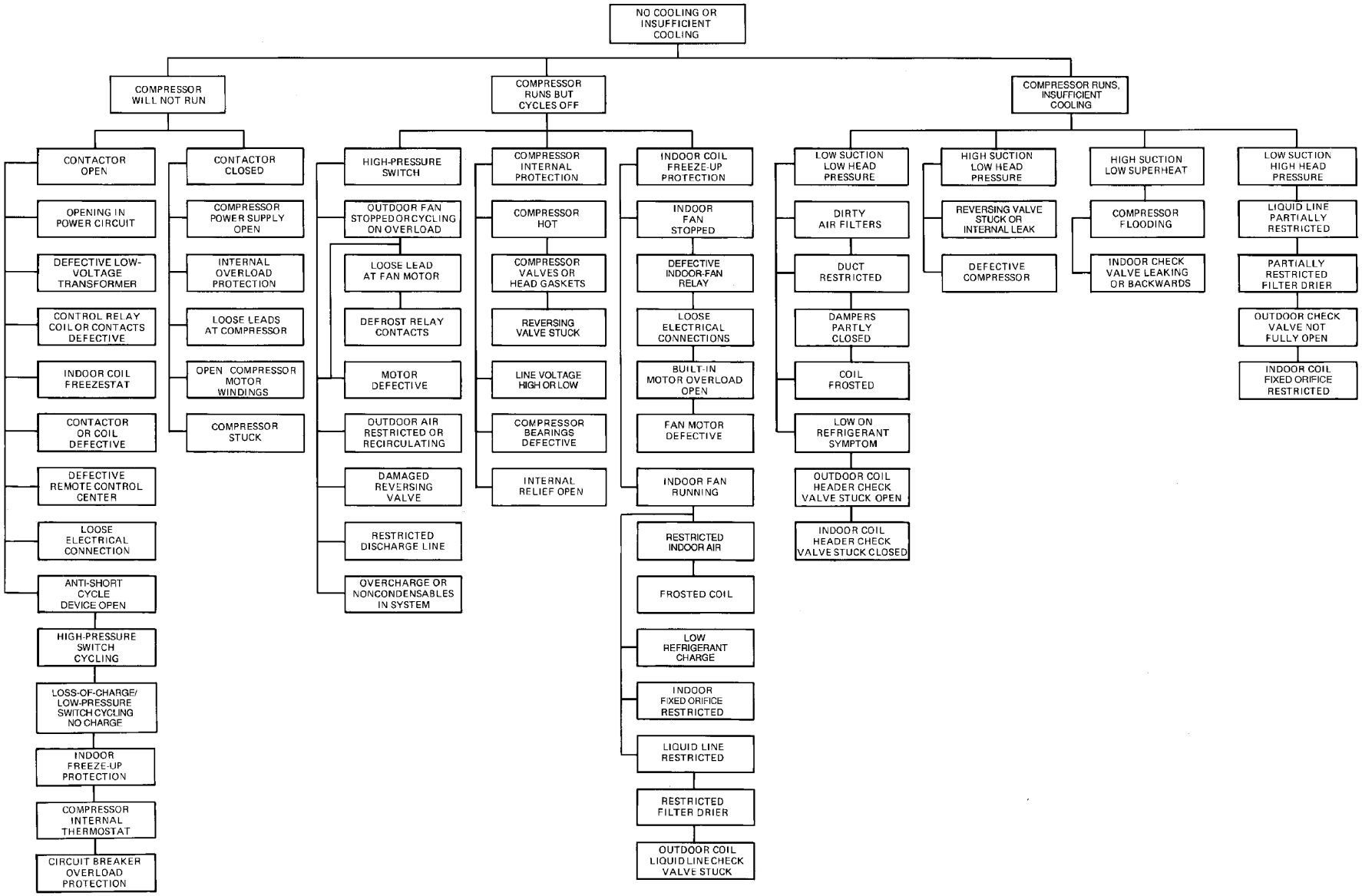


Fig. 55 — Troubleshooting Chart, Cooling Cycle

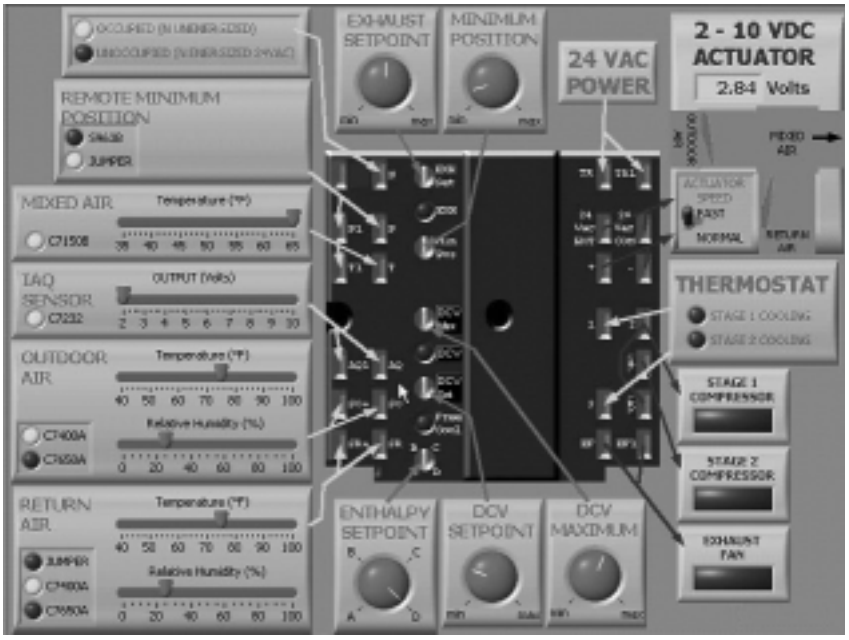


Fig. 56 — EconoMi$erIV Functional View

INDEX

Air quantity limits *24*
Carrier Comfort Network *12*
Changeover set points *20*
Charging chart, refrigerant *33*
Clearance *5, 6*
CO_2 sensor
  Configuration *23*
  Settings *22, 23*
Compressor
  Lockout *34*
  Lubrication *31*
  Mounting *24*
Concentric duct *7, 8*
Condensate drain
  Cleaning *31*
  Location *7, 9*
Control circuit
  Wiring *9*
Convenience outlet *9*
Crankcase heater *24, 34*
Defrost thermostat *4, 31*
Demand control ventilation *22*
Dimensions *2, 5, 6*
Ductwork *3, 7*
EconoMi$erIV *18-23*
  Control mode *20*
  Controller wiring *19*
  Damper movement *22*
  Demand ventilation control *22*
  Troubleshooting *38, 39, 43*
  Usage *20*
  Wiring *19*
EconoMi$er2 *18, 19*
Electric heat *27*
Electrical connections *7*
Electrical data *8*
Enthalpy changeover set points *21*
Filter
  Cleaning *31*
  Size *4*
Filter drier *34*
Freeze protection thermostat *34*
Glycol hydronic coil *24, 28*
Heat anticipator settings *9*
High-pressure switch *4*
Hinged access doors *34*
Horizontal adapter roof curb *3*
Indoor air quality sensor *12, 21*
Indoor coil *4*
  Cleaning *31*
Indoor fan motor
  Lubrication *31*
  Motor data *28*
  Performance *25-27*
  Pulley adjustment *31, 32*
  Pulley setting *4, 28*
  Speed *4*
Low-pressure switch *4*
Manual outdoor air damper *10*
Motormaster I control *10, 11*
Mounting
  Compressor *24*
  Unit *1*
Non-fused disconnect *9, 10*
Operating sequence *29-31*
  Cooling *29*
  EconoMi$erIV *29*
  EconoMi$er2 with
    PremierLink control *29-31*
  Heating *29*
Outdoor air hood *10, 11*
Outdoor air inlet screens
  Dimensions *4*
  Cleaning *31*
Outdoor air temperature sensor *12, 18*
Outdoor coil *4*
  Cleaning *31*
Outdoor fan *4*
  Adjustment *33*
Physical data *4*
Power supply *7*
  Wiring *9*
PremierLink controls *12-15*
Pressure, drop
  Economizer *27*
  Electric heat *27*
  Glycol heat *27*
Pressure switches
  High pressure *4*
  Low pressure *4*
Refrigerant
  Charge *33*
  Type *4*
Refrigerant service ports *24*
Replacement parts *34*
Return air filter *4, 24*
Return air temperature sensor *20*
Rigging unit *1, 3*
Roof curb
  Assembly *1*
  Dimensions *2*
  Leveling tolerances *2*
  Weight *4*
Safety considerations *1*
Service *31-37*
Start-up *24-31*
Start-up checklist *CL-1*
Supply-air temperature sensor *12, 18*
Thermostat *9*
Troubleshooting *38-43*
Weight
  Corner *5, 6*
  Economizer *4*
  Maximum *3*
  Unit *4*
Wind baffle *11*
Wiring
  Differential enthalpy *17*
  EconoMi$erIV *19*
  EconoMi$er2 *19*
  Power connections *9*
  PremierLink *13*
  Thermostat *9*
  Unit *35, 36*

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

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START-UP CHECKLIST
(Remove and Store in Job File)

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

I. PRE-START-UP

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY PROPER ADJUSTMENT OF INDOOR FAN MOTOR ADJUSTMENT BOLT (014 UNITS) AND ADJUSTMENT BOLT AND PLATE (016 UNITS)
- ☐ LOOSEN ALL SHIPPING HOLDDOWN BOLTS PER INSTRUCTIONS
- ☐ OPEN ALL SERVICE VALVES (SUCTION, DISCHARGE, AND LIQUID)
- ☐ VERIFY INSTALLATION OF OUTDOOR-AIR HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK THAT AIR INLET SCREENS AND RETURN-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SET SCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AL LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____

INDOOR-FAN AMPS — COMPRESSOR NO. 2 (016 ONLY) L1 _____ L2 _____ L3 _____

SUPPLY FAN AMPS _____ EXHAUST FAN AMPS _____

ELECTRIC HEAT AMPS L1 _____ L2 _____ L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ F DB (Dry-Bulb)

RETURN-AIR TEMPERATURE _____ F DB _____ F WB (Wet-Bulb)

COOLING SUPPLY AIR _____ F

HEAT PUMP SUPPLY AIR _____ F

ELECTRIC HEAT SUPPLY AIR _____ F

PRESSURES (COOLING MODE)

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 (016 ONLY) _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 (016 ONLY) _____ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 33

GENERAL

☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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